RESEARCH REPORT

AN EXAMINATION OF THE USE OF DOMESTIC SPACE BY INUIT FAMILIES LIVING IN ARVIAT, NUNAVUT

EXTERNAL RESEARCH PROGRAM

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AN EXAMINATION OF THE USE OF DOMESTIC SPACE BY INUIT FAMILIES LIVING IN ARVIAT, NUNAVUT

DR. PETER C. DAWSON, OCTOBER 10, 2003.

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Abstract.

Recent ethnographic fieldwork in the Canadian Arctic has revealed differences in the patterning of domestic activities by Inuit and Euro-Canadian families. These differences are reflected in the types of activities Inuit families carry out, and how these activities are distributed within houses. The majority of Inuit family activities occur in integrated spaces such as living rooms and kitchens, because daily activities provide an important context for social interaction among family members. The use of space syntax analysis to examine houses built over the past 50 years in the Canadian north indicates a trend towards floor plans with narrow view fields and a greater number of smaller rooms. This trend reflects the increasing importance of individualism and privacy in Euro-Canadian society, and is not compatible with the more collective forms of social interaction that characterize Inuit families. These results should be of importance to architects and planners interested in designing and building houses that better reflect the cultural values and lifestyles of Inuit families.

Executive Summary.

During the summer of 2002, the author spent two months living in the community of Arviat, Nunavut, documenting patterns of housekeeping among Inuit families. The objective of the project was to answer the following question: Are the domestic activities of Inuit families compatible with the spatial configuration of Euro-Canadian house models currently used in the Canadian Arctic? Observations of Inuit space use were organized into a relational database, and used in combination with the spatial analysis of houses occupied by Inuit families. The spatial analysis was completed using a number of innovative computer-based techniques for analyzing architecture developed at Space Syntax Laboratories, University College London. This project represents the first time these techniques have been applied in Canada.

A. Summary of Observations and Spatial Analysis.

1. The types of domestic activities Inuit families in Arviat currently engage in differ significantly from those of southern Euro-Canadian families. These differences reflect cultural values in Inuit society which emphasize the social solidarity of the extended family, and its primary function as a network of mutual assistance. The domestic activities of Inuit families also reflect their continued reliance on a land-based economy.

2. When domestic activities are sequenced according to spatial integration, Inuit families distribute their activities differently than Euro-Canadian families. While Inuit families concentrate a wide range of activities in a few highly integrated spatial locations, the activities of Euro-Canadian families are more widely dispersed throughout the house. This likely reflects the fact that domestic activities provide opportunities for socializing, information exchange, and the continual re-affirmation of family solidarity. The spatial integration of Inuit family activities also likely reflects different cultural values associated with individuality and privacy.

3. Over the past 30 years, house designs built in the north have become increasingly sub-divided, resulting in greater numbers of rooms which differ in degree of accessibility. Increasing internal partitioning has also narrowed view fields, resulting in the loss of visual information as one moves about the house. By limiting what can be seen, the addition of more walls makes it difficult for individuals to interact with other family members and monitor/participate in their activities.

4. The changes in spatial configuration identified in (3) would seem to be incompatible with the observations outlined in (2). Spaces are often too small to accommodate the unique activities of Inuit families. Furthermore, the primary function of the Inuit family as a network of mutual assistance means that it is far more socially integrated than a Euro-Canadian family. Because higher degrees of social integration require higher levels of visual information, the trend towards increasing spatial segregation

in Euro-Canadian house forms is likely incompatible with the social structure of Inuit families. The effect is that the unique domestic activities of Inuit households are more difficult to organize, execute, and monitor.

5. Inuit residents have attempted to improve on the incompatible aspects of their house designs by implementing a number of innovative changes using everyday materials that are inexpensive and easily obtained.

B*. *Design Recommendations Based on Observational Data and Spatial Analysis.

1. **The construction of houses with more open floor plans generating wider viewfields that do not restrict the flow of visual information**. This could be achieved by eliminating long central corridors from which other rooms are accessed. Instead, smaller rooms such as bedrooms, utility rooms and workshops would open directly onto a single, large open space.

2. **The integration of kitchen and living room into this single, enlarged space.** This type of layout coincides with observational data which indicates that most family activities take place in the living room and kitchen.

3. **The construction of large enclosed cold porches on the front of the house.** This design modification is supported by observations of the need for cold porches in the facilitation of traditional activities such as hunting and fishing. These enclosures should be fitted with a locking door to deter instances of theft.

4. **The elimination of multi-story dwellings in favor of single-floor dwellings.** This would reduce the problem of the overheating of the second floor during the summer months, as well as widen viewfields throughout the house thereby increasing its visual accessibility. This recommendation also addresses a preference for single floor dwellings expressed by the majority of Inuit families.

5. **The replacement of small standard kitchen sinks with larger stainless steel sinks to accommodate traditional foods which tend to be larger and bulkier than store-bought western foods.**

6. **The addition of more energy efficient stoves with larger heating elements to accommodate the boiling of traditional foods such as caribou meat in large cooking pots.** Alternatively, the construction of outdoor brick fire pits so that large pots of meat can be brought to boil more quickly and efficiently.

7. **The construction of larger storage cupboards in kitchens to accommodate large cooking pots which are important in the preparation of traditional foods.**

8. **The addition of better ventilation systems to accommodate large amounts of condensation released during the boiling of traditional foods in large cooking pots.**

9. **The addition of self-closing (spring-loaded) doors to reduce heating bills during cooler months. This would eliminate the problem of children and visitors leaving doors open when entering and exiting the house.**

10. **The development and construction of more storage solutions for clothing, toys, and other items used by Inuit families.**

11. **The construction of elevated gravel pads along the sides of houses to serve as dedicated work areas for repairing snowmachines, ATC's, boats, komatiks (sleds), etc.** The elevation of these gravel platforms would deter people from driving in between houses and prevent the pooling of water. In addition, the gravel could be changed periodically to remove the accumulation of pollutants such as oil and gas spills.

12. **The placement of skirting around the foundations of all houses, leaving southern sides open to warmer winds, thereby reducing heating bills**

13. **The replacement of all door hardware (knobs, locks) with heavy duty industrial latches and handles.**

14. **The attachment of vinyl or linoleum sheets to lower portions of interior house walls to reduce damage caused by scratching and drawing from children.**

Many of the recommendations that have come out of this study should be relatively inexpensive and easy to incorporate into existing house designs. However, it is critical that this study be expanded into other Inuit communities across Nunavut. Such a long term, systematic study could be used to anticipate the future housing needs of Inuit families as they continue to change in structure and composition.

Résumé

Au cours de l'été 2002, l'auteur a séjourné pendant deux mois dans la communauté d'Arviat au Nunavut, afin de recueillir de l'information sur les caractéristiques domestiques des familles inuites. Le projet avait pour but d'apporter une réponse à la question suivante : les activités domestiques des familles inuites sont-elles compatibles avec la configuration spatiale des modèles de maison euro-canadiens présentement utilisés dans l'Arctique canadien? Les observations sur l'utilisation de l'espace dans les logements inuits ont été classées dans une base de données relationnelle et utilisées en combinaison avec l'information sur l'analyse spatiale des logements qu'occupent les familles inuites. Cette analyse a été réalisée à l'aide d'un certain nombre de techniques informatiques novatrices d'analyse de l'architecture mises au point par les Space Syntax Laboratories, University College London. Ces techniques ont été utilisées pour la première fois au Canada aux fins du présent projet.

A. Sommaire des observations et de l'analyse spatiale

1. Les types d'activités domestiques auxquelles se livrent les familles inuites d'Arviat diffèrent considérablement de ceux des familles euro-canadiennes du sud. Ces divergences dénotent les valeurs culturelles de la société Inuit, tout particulièrement la solidarité sociale de la famille élargie et sa fonction essentielle à titre de réseau d'aide mutuelle. Les activités domestiques des familles inuites font également ressortir leur dépendance d'une économie terrestre.

2. Lorsque les activités domestiques sont organisées conformément à une intégration spatiale, les familles inuites ne répartissent pas les leurs de la même façon que les familles euro-canadiennes. Les familles inuites concentrent des activités très diverses dans un petit nombre d'endroits spatiaux hautement intégrés, à l'encontre des familles euro-canadiennes qui répartissent les leurs dans toute la maison. Cette constatation résulte probablement du fait que les activités domestiques sont l'occasion d'événements sociaux, d'échange d'information et de renforcement continu de la solidarité familiale. L'intégration spatiale des activités familiales inuites reflète aussi probablement d'autres valeurs culturelles liées à l'individualité et au respect de la vie privée.

3. Les maisons construites dans le Nord au cours des 30 dernières années ont été conçues en subdivisant de plus en plus l'espace, afin de produire un plus grand nombre de chambres accessibles à divers degrés. Ce partitionnement interne accru a également réduit les champs de vision et entraîné la perte d'information visuelle d'un endroit à l'autre de la maison. En limitant ce qui peut être vu, les cloisons qui sont ajoutées empêchent les occupants de communiquer entre eux et de surveiller les activités ou d'y participer.

4. Il semblerait que les changements de la configuration spatiale relevés en 3) soient incompatibles avec les observations indiquées en 2). Les espaces sont souvent trop restreints, compte tenu des activités uniques des familles inuites. En outre, la fonction de la famille inuite étant essentiellement celle d'un réseau d'aide mutuelle, son intégration sociale est bien supérieure à celle d'une famille euro-canadienne. Étant donné que des degrés plus élevés d'intégration sociale nécessitent des niveaux accrus d'information visuelle, la tendance en faveur d'une plus grande ségrégation spatiale dans les modèles de maisons euro-canadiennes est probablement incompatible avec la structure sociale des familles inuites. Les activités domestiques bien particulières des ménages inuits sont par conséquent beaucoup plus difficiles à organiser, à réaliser et à surveiller.

5. Les résidents inuits ont tenté de remédier à certains aspects incompatibles de l'agencement de leurs maisons en apportant des modifications novatrices, à l'aide de matériaux courants, bon marché et faciles à obtenir.

B. Recommandations relatives à la conception découlant des observations et de l'analyse spatiale

1. **Les maisons construites selon un agencement plus ouvert de l'espace créent des champs de vision élargis qui ne restreignent pas la continuité de l'information visuelle.** On pourrait y parvenir en éliminant les longs couloirs centraux, à partir desquels on accède aux autres pièces. Les plus petites pièces, comme les chambres, les pièces utilitaires et les ateliers, donneraient plutôt accès directement à un seul vaste espace ouvert.

2. **L'intégration de la cuisine et de la salle de séjour dans cet espace unique, élargi.** Ce type d'agencement coïncide avec les observations réalisées, selon lesquelles la plupart des activités familiales se déroulent dans la salle de séjour et la cuisine.

3. **La construction de vastes porches fermés non chauffés à l'avant de la maison.** Les observations relevées au sujet des porches non chauffés pour faciliter les activités traditionnelles, comme la chasse et la pêche, viennent confirmer cette modification de la conception. Ces espaces fermés devraient être munis de portes à verrous, pour décourager les vols.

4. **L'élimination des logements à plusieurs étages au profit de logements d'un seul niveau.** On pourrait ainsi réduire l'ensoleillement excessif du deuxième étage pendant les mois d'été, et élargir les champs de vision dans la maison en augmentant l'accessibilité visuelle. Cette recommandation tient également compte de la préférence de la plupart des familles inuites pour des logements de plain-pied.

5. **Le remplacement des petits éviers courants dans les cuisines par des éviers plus larges en acier inoxydable, pour tenir compte du fait que la taille et le volume des aliments traditionnels sont généralement supérieurs à ceux des aliments achetés dans les magasins traditionnels.**

6. **L'ajout de poêles beaucoup plus éconergétiques avec de grands éléments chauffants pour la cuisson des aliments traditionnels, comme la viande de Caribou dans de larges récipients.** À la rigueur, on pourrait aussi construire des foyers en briques à l'extérieur, afin d'amener plus facilement et rapidement à ébullition le contenu de larges récipients.

7. **La construction de larges armoires dans les cuisines pour y ranger les grands récipients de cuisson qui sont indispensables pour la préparation des repas traditionnels.**

8. **L'ajout de systèmes de ventilation améliorés pour éliminer la grande condensation d'humidité pendant la cuisson à ébullition des aliments traditionnels.**

9. **L’ajout de portes se refermant automatiquement (actionnées par ressort) afin de réduire les factures de chauffage pendant les mois les plus froids. On éliminerait ainsi le problème des portes que les enfants et les visiteurs laissent ouvertes lorsqu’ils entrent dans la maison ou en sortent.**

10. **La mise au point d’autres solutions pour le rangement des vêtements, des jouets et d’autres articles qu’utilisent les familles inuites et leur mise en application.**

11. **La construction de plate-formes surélevées en gravier sur le côté des maisons pour y réparer des motoneiges, des véhicules tous terrains, des bateaux, des traîneaux, etc.** Ces plate-formes construites au-dessus du niveau du sol dissuaderaient les gens de conduire entre les maisons et empêcheraient l’eau de s’accumuler. En outre on pourrait remplacer périodiquement le gravier sali notamment par l’accumulation de tâches d’huile et d’essence.

12. **L’installation d’une ceinture de vide sanitaire autour des fondations de toutes les maisons, en laissant ouverts les côtés exposés au sud, afin de profiter des vents chauds, et de réduire ainsi les factures de chauffage.**

13. **Le remplacement des boutons et des serrures des portes par des poignées et des serrures ultra robustes.**

14. **L’installation de feuilles de vinyle ou de linoléum sur la partie inférieure des murs intérieurs de la maison, afin de réduire les dommages occasionnés par les enfants.**

Les recommandations découlant de cette étude devraient être, dans bien des cas, relativement peu coûteuses et faciles à incorporer dans la conception des logements. Il est toutefois crucial que cette étude soit réalisée dans d’autres communautés inuites de l’ensemble du Nunavut. Une étude systématique, à long terme de ce type, pourrait servir à prévoir les futurs besoins des familles inuites en matière de logement à mesure de l’évolution de leur structure et de leur composition.

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Introduction.

Life in an Inuit community does not parallel life in southern Canada. Family values, entertaining and visiting habits, as well as daily activities such as hunting, fishing, the upkeep of rifles, fishing nets, and snow machines define cultural values[1] that differ considerably from those of Euro-Canadian society. Yet, since the 1950s, northern housing policy and urban planning have focused primarily on providing cost-effective, durable Euro-Canadian style houses and efficiently serviced communities to Inuit peoples. The unique economic and cultural configurations of Inuit families have been largely left out of the design and planning process. As a result, we might expect the patterns of housekeeping practiced by Inuit families to differ radically from those of their Euro-Canadian counterparts. This seems to have been the case 30 years ago, when several studies were initiated by federal government agencies to examine how the switch to Western housing had impacted Inuit family life. At the time, fieldworkers documented families butchering animals in living rooms, storing seal meat in bathtubs, drum dancing in living rooms, and using kitchens to repair engines and fire arms. But is this still the case today? Do Inuit families continue to graft their unique activities and cultural values spatially onto the Euro-Canadian style houses they currently occupy? And if so, then what effect has this had on domestic life, social interactions among friends and family members, and the adequacy and durability of northern housing? Can new design principles be developed from the documentation of such differences that could assist in the development of houses that better reflect the lifestyles and cultural values of Inuit families?

[1] Cultural values refer to the aspects of economic, social, and religious life that people in a particular society consider important.

Map 1. Location of the community of Arviat, Nunavut.

The objective of this project is to examine these important questions through field research conducted in the hamlet of Arviat, Nunavut, during the summer of 2002 (Map 1). Observations of the domestic activities of Inuit families were mapped onto the floor plans of northern houses. An innovative new technique called S*pace Syntax Analysis,* developed at the Bartlett School of Architecture, University College, London, was then used to analyze these observations. A relational database of space use by Inuit families was also constructed using Microsoft Access to serve as a decision-support system by architects and planners working in the Canadian north. Preliminary results indicate that Inuit families differ from Euro-Canadian families in both the types of domestic activities they engage in and how these activities are distributed within the house. The observational approach used in this project complements recent studies of Inuit *Qaujimajatuqangit*[2] (knowledge of all areas of life) because it provides an objective description of how Inuit families actually operate in Euro-Canadian house forms. By combining the

[2] On September 29-30, 1999, the Government of Nunavut hosted an Inuit *Qaujimajatuqangit* Workshop. The overall goal of the workshop was to seek counsel from Elders on how Inuit traditional knowledge could be integrated into government policies, programs and services. Recently, the Nunavut Housing Corporation has hosted a number of workshops on housing which also utilize Inuit *Qaujimajatuqangit.*

experiential knowledge of Inuit Elders with direct observations of space use by families, architects and planners can be informed about the unique activities and cultural values of Inuit and incorporate these aspects of Northern life into future house designs.

Background: Housing in Canadian Arctic

Inadequate housing has been recognized as a critical issue by both Inuit political organizations (McEwen, 1976) and the Canadian Federal Government (Williamson, 1996). Overcrowding, structural engineering problems, and the high cost of delivering and maintaining housing in northern regions are among the most pressing concerns. The results of a 1991 Aboriginal Peoples Survey released by Statistics Canada, for example, reveal that the number of Inuit occupants living in an average house is more than twice the national average. Furthermore, climatic factors, poor construction, and overcrowding usually limit the life expectancy of houses in the north to only five or six years (Williamson 1996:22). Often overlooked is the issue of how well the designs of current northern housing stocks suit the activities, cultural values, and lifestyles of contemporary Inuit families. Collectively, many reports acknowledge that family size and structure, daily patterns of activity inside and outside of the house, entertaining and visiting habits, shared community activities, activities allocated to different rooms, and the time spent on various activities inevitably differ between Inuit and Euro-Canadian families (Inuit Non-Profit Housing Corporation, 1984). The resulting recommendations typically outline the need for Inuit involvement in the design process (Inuit Non-Profit Housing Corporation 1984:5). Despite these recommendations, a long-term, systematic study of Inuit spatial behavior in Euro-Canadian style houses has yet to be initiated in the Canadian Arctic. This is regrettable, given that a survey of the literature on northern housing issues reveals that the cultural incompatibility between Euro-Canadian house designs and Inuit culture clearly contributes to such problems as overcrowding and the short life expectancy of housing stock.

To illustrate, while traditional houses were designed to accommodate extended families: the principal social unit in Inuit society, Euro-Canadian houses have been designed around the

concept of single nuclear families (Balikci 1964; Damas 1969a,b,; Miron, 1988). Consequently, in the early days of social housing programs in the north, the desire for kin to live together often contributed to overcrowded conditions (Pauktuutit Inuit Women's Association, 1984). Likewise, traditional Inuit food preparation activities commonly involved boiling which lead to exceedingly high levels of condensation that the building systems of Euro-Canadian houses were not designed to accommodate. This resulted in the icing of windows and the warping of floors and walls (Bruce 1969:6). Finally, the segmentation of open areas into spaces with specific functions such as bedrooms, living rooms, and kitchens, often made it difficult to engage in traditional activities like animal butchering, hide preparation, and the repair and maintenance of hunting equipment (Thomas and Thompson, 1969). In the 1960s, the use of living room floors for the dressing of game and bathtubs for the storage of meat created unsanitary conditions that placed the health of the family at risk (Thomas and Thompson, 1969). At present, little but anecdotal information exists on the degree to which Inuit families currently engage in traditional activities within their homes. Consequently, an updated study of the patterns of housekeeping practiced by Inuit families is warranted, given that current research by Wenzel (1995), Freeman et. al (1992) and others indicates that traditional activities relating to the procurement, sharing, and consumption of food continue to be of cultural importance to most households. Recent developments in the analysis of domestic space using computer modeling offer a new and innovative avenue for exploring these issues.

Background: The Spatial Analysis of Domestic Architecture

In 1984, Hillier and Hanson published *The Social Logic of Space* in which they outlined a syntactic theory for the organization of space in buildings and settlements. In the book they argued that buildings, towns, and cities have particular spatial properties that translate into sociological rules that affect where people situate activities and how they relate to one another. Within this framework, the spatial configuration of a dwelling or settlement is believed to represent a fairly precise map of the economic, social, and ideological relations of its inhabitants

(Hanson 1998:13). Over the past 18 years, the theory and method of space syntax have undergone a great deal of development. This has been due largely to three factors; the application of space syntax to a wider range of building and settlement types (Hillier 1996; Hanson 1994,1998; Peponis et al 1997), the development of sophisticated computer software that has allowed researchers to numerically capture differences in the configuration of spaces (Penn et al 1998; Turner 2001), and the organization of three international symposia on space syntax research (2002, 1999, 1997).

Results indicate that *integration* and *connectivity* are powerful predictors for how "busy" or how "quiet" a space will be (Hanson 1998:10). Spaces are usually connected together in ways that vary how integration is distributed throughout the structure, making some areas of a dwelling more accessible than others. This sequencing of integration serves to regulate interactions among inhabitants and to spatially separate activities which might be deemed incompatible because of their characteristic features (noisy/messy versus quiet/clean) and social context (individual versus communal, private versus public). Integration has emerged from empirical studies as the most important way in which houses convey culture through their spatial configurations (Hanson 1998:32). If houses display regularities in their spatial configurations, they are said to share similar constructions of social interfaces among family members and to distribute domestic activities in similar ways. Conversely, if houses display differences, then the social interfaces and spatial distribution of domestic activities must also differ. One of the basic strategies of space syntax research, then, is to search for invariants in spatial patterning, and translate these into family activities and values that are culturally specific. If we apply space syntax theory to northern housing, then the spatial patterning of Euro-Canadian houses would seem to reflect the cultural values and domestic activities of Western families. If true, then the spatial configuration of Euro-Canadian house designs is likely incompatible with the cultural values and domestic activities of Inuit families.

In order to examine the spatial patterning present within a house, a configurational description of

its internal layout is produced using computer software that allows the researcher to examine mathematically how rooms differ according to their accessibility and visibility from different locations within the house. The accessibility and visibility of a room and its contents often define the kinds of activities that are likely to occur there. For example, activities situated in spaces that are not easy accessed or visible are usually quite different from activities situated in spaces that are easier to access and view.

Anthropological research (Kent 1984, 1990) demonstrates that these differences are mediated by the *mechanical properties* and *social context* of the activity itself. Mechanical properties include how "noisy" or "messy" an activity is, how much space it requires, how frequently it occurs, and whether or not it requires specialized equipment (tables, tools, appliances). As a result, "noisy" or "messy" activities are often performed in rooms that are spatially and visibly secluded because they can interfere with other domestic activities that require concentration or a clean work area. In contrast, the social context of an activity relates to notions of public and private. In many western cultures, sexual intimacy and sleeping are activities that occur within a very narrow social context because they are typically viewed as private. Accordingly, they tend to occur in spaces that are more spatially and visually secluded. Conversely, watching television and playing cards are activities which occur within a much wider social context because they are viewed as more public. Therefore they tend to be situated in spaces of greater accessibility and visibility.

Cultures differ in the way in which they conceptualize the mechanical properties and social context of activities (Kent, 1986). For example, some cultural groups are far more tolerant of "lumping" together activities with different mechanical properties in the same spatial location. To illustrate, Kent (1986) documented the scheduling and location of daily activities within Euro-American, Hispanic, and Native American households and found that the patterns of housekeeping between these different ethnic groups varied along a continuum, from segmentation to unity. Households which maintained sex-specific and mono-functional activity areas tended to segment and compartmentalize them in space, thereby re-enforcing attitudes of sexual division of

labor, individuality, and the need to keep various activities ordered and separated (Kent 1984:196-97). In contrast, households in which different activities were conducted by the same individuals tended to unify such activities in space. This, in turn, reflected a weaker division of labor, and fewer differences between male and female activities (Kent 1984:204).

Kent's (1984) research is of particular importance to this project because it demonstrates that one's perception of the compatibility or incompatibility of domestic activities is often mediated by cultural factors. Furthermore, these differing perceptions influence how the floor plan of the house will be subdivided and where family members will choose to situate activities. The Euro-American families in Kent's (1984) study, for example, were far less tolerant of "lumping" activities together in the same spatial location than Hispanic and Native American families. This was reflected in the designs of their houses which tended to have more subdivided floor plans consisting of many smaller rooms used for specific types of activities. If this were also the case for Euro-Canadian families, then the "lumping" together of activities at single spatial locations by Inuit families would seem to be incompatible with the more compartmentalized spatial configurations of western houses.

Background to Study: The Community of Arviat

In order to investigate this premise, it is necessary to: a) document the domestic activities of Inuit families, b) map their spatial locations within the house, and c) examine how the domestic activities of an Inuit family are spatially distributed relative to the accessibility and visibility of the rooms within which they occur. For the purposes of this project, fieldwork was conducted in the hamlet of Arviat, Nunavut.

Formerly known as Eskimo Point, Arviat is located on the western coast of Hudson Bay and is currently home to approximately 2000 people (Map 1). Inuit families form the majority of the population and are broadly categorized as "Caribou Inuit"; a label assigned by ethnographers to all Inuit groups living on or near the west coast of Hudson Bay. In the 1920s the Hudson's Bay Company (HBC) initiated efforts to establish trading posts in areas north of Churchill, Manitoba.

Figure 1. Hunting camp near the community of Arviat.

Early explorers to this region by HBC ships had observed large numbers of Inuit gathering seasonally on two islands south of the Maguse River. Over the next few years, a trading post and Roman Catholic Mission were established at a nearby location known as Cape Eskimo. This original site soon proved to be unsuitable as it afforded little room for expansion, and lacked access to fresh water. The community was moved a few minutes' walk to the west in 1928-29. The RCMP established a detachment in 1936 in anticipation of the expansion and growth of the settlement over the next several decades. During the 1950s and 1960s, Caribou Inuit groups were encouraged to permanently settle at Eskimo Point (Arviat) and other communities in the region so that they could be better provisioned with housing, healthcare and education by the Canadian government. This initiative was partially triggered by episodic famines which frequently plagued the area due to oscillations in the availability of caribou. A prolonged famine in the first part of the 20th century, for example, had reduced the total Caribou Inuit population to 500 by 1922 (Burch and Czonka 1999:57). David Damas (1988) has remarked that the creation of such permanent settlements in other areas of the Canadian Arctic brought about the end of the contact-

traditional horizon; a period when Inuit lived more or less autonomously of mainstream Euro-Canadian society. The establishment of a nickel mine at Rankin Inlet in 1958 resulted in many hunters leaving Arviat to obtain work. These years were also difficult for the town's residents as regular epidemics of colds, influenza, dysentery and polio occurred. On September 1st, 1977, Eskimo Point assumed the legal status of Hamlet, which enabled it to propose and administer its own budget, and enact and enforce its own bylaws. Further progress was made towards self-determination on April 1, 1999, following the creation of Nunavut Territory.

While many changes have affected Inuit life in the Post-WWII era, the majority of families in Arviat continue to engage in traditional activities to varying degrees. These activities supplement family incomes and serve as an important source of cultural identity. Outpost camps are maintained by many families and are used to prepare dried caribou meat and char (Figure 1). In addition, beluga whales, a variety of shorebirds, black bears, polar bears, and berries are all important foods for Inuit families living in Arviat. On average, Inuit consultants stressed that over 50% of the food they consumed was derived from the land. Many aspects of traditional Inuit social organization are also evident, including social networks of mutual assistance, the importance of bilateral extended families as the primary economic and social unit of production, as well as many aspects of kinship and marriage. The strong traditional character of Arviat makes it an ideal location for this research project.

Methodology: Configurational Analysis of Houses

Accessibility and visibility are two variables which correlate with *integration*: a normalized (inverse) measure of the mean shortest path from one point to all other points in a building. The mean shortest path can be measured in terms of either line of movement or line of sight. Space syntax software maps how integration is distributed throughout the structure in accordance with these two properties, thereby immediately capturing the configurational properties of a building. This provides the researcher with a numerical method of comparing how the activities of different households are spatially sequenced within the house (Hanson 1998:23; Hillier and Hanson 1984:

108-140).

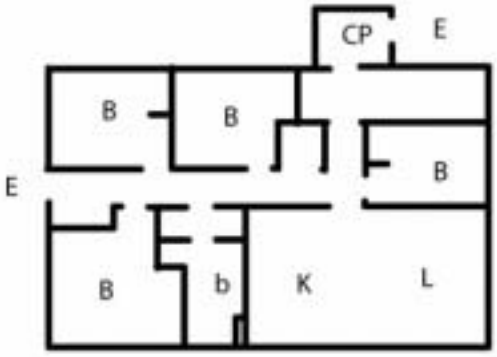
Three methods were used to map and measure the distribution of integration within Arviat houses: justified permeability graphs, 2D convex analysis, and visibility graph analysis. Figure 2 presents an example of how these three methods are used to generate configurational descriptions for an Access 4-bedroom house.

Justified permeability graphs (JP) map integration using a graph-based theory of nodes (rooms) and edges (points of entry and exit). A computer program called *Netbox* has been developed specifically for the construction of justified permeability maps and allows for the rapid calculation of integration values (Figure 2). 2D convex analysis breaks up the rooms in a house into "blocks" which are then joined together using connectors in accordance with the placement of doorways. Convex break-up maps are next processed using a computer program called *Pesh* which color-codes each room according to its integration value. The colors are mapped using the red-green-blue color spectrum, with red indicating highly integrated ("hot"), all the way down through the spectrum to blue, meaning poorly integrated ("cold") (Figure 2).

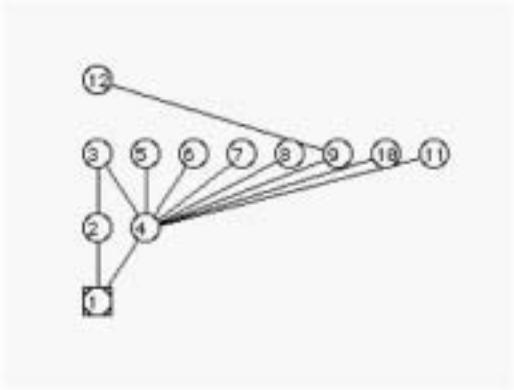
Visibility graph analysis examines how the placement of walls and doorways causes the viewfield (what can be seen) to widen or narrow as one moves through a house. This analytical technique takes a selection of points across a space and forms graph edges between those points if they are mutually visible. The result is a visibility graph which maps the dimensions of all of the viewfields apparent within the house. As such, the technique is similar to those used elsewhere in landscape analysis or in computation geometry. Once the graph is constructed, measures of integration can be taken for various locations within the house. A Space Syntax program called *Depthmap* has been developed for the construction and analysis of visibility graphs (Figure 2).

Justified Permeability (JP) maps, 2D convex break-up maps, and visibility graphs were constructed for all house models currently used in Arviat, Nunavut. The floor plans of houses were obtained from Canada Mortgage and Housing Corporation (CMHC), Nunavut Housing Corporation, and the Arviat Housing Association.

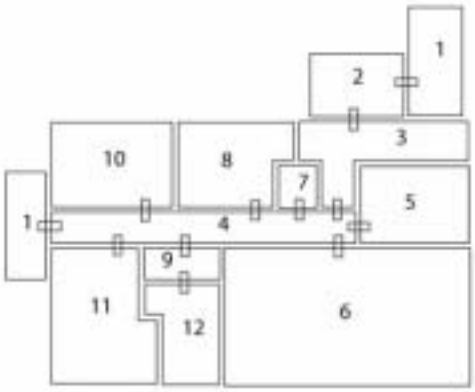
Access 4 Bedroom House



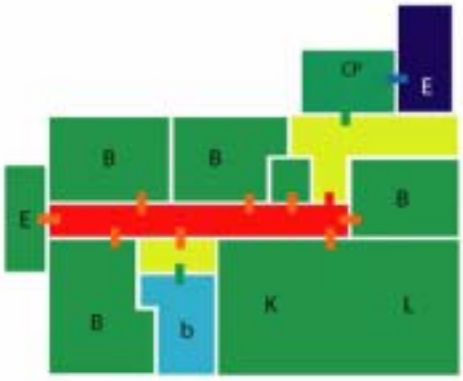
Floor Plan of Access House



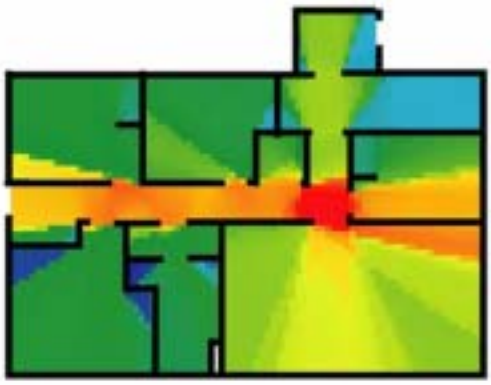
Justified Permeability Map of Access House



2D Convex Break Up of Access House



Processed 2D Convex Break Up



Visibility Graph of Access House

12

Figure 2. Examples of configurational descriptions for an Access 4-bedroom house.

Methodology; Field Observations

Surveys of the spatial distribution of domestic activities within Inuit houses were made using the "static snapshot" method of observation. Using this technique, the observer walks from room to room within the dwelling and takes a mental snapshot and digital photograph of all moving and stationary activities that are occurring at that moment. The snapshot is then recorded on a plan view (1:50 minimum scale) of the house coded according to the activity. The standard categories which are measured are listed in Table 1. Snap-shot observations are taken at various points during the day such as meal times, mid-morning, mid-afternoon, and mid-evening. For the purposes of this study, observations were recorded over a period of two months (late June to late August). The recruitment of households was carried out on a volunteer basis. Families were approached informally and asked to participate in the study. The observations and snapshots collected were then used to construct a relational database of information on space use by Inuit families using Microsoft Access. The categories used in the relational database included: house address, house model, number of bedrooms, all activities observed during the time of the visit, where they occurred within the house, and a photo reference number for digital images of any domestic activities recorded. Integration values were next assigned to each activity using the value calculated for the room in which it was observed. This resulted in a total of 357 domestic activities recorded from a sample of 47 houses.

Results of Analysis

The following is a summary of field data collected during the summer of 2002 in Arviat. This summary forms a part of what is intended to become a long-term systematic study of the spatial behavior of Inuit families across the Canadian Arctic.

A. Observations of Space Use by Inuit Families

The domestic activities of the Inuit families participating in this study can be broadly categorized into the following ten categories: cooking; hunting/fishing; sewing; crafts; maintenance; eating; storing; socializing; personal needs; and a generic "other" category. Each of these categories is

Figure 3. Visiting with family and friends.

comprised of many different sub-categories which define specific activities. These categories and sub-categories are listed in Table 1. Tables 2 through 8 are cross tabulations calculated from the relational database which summarize the frequency in which the various categories and sub-categories of activity were observed for each room in the 47 houses visited. Pie charts are also included in each cross tabulation which graph the percentages of activities observed in each room. The categories and subcategories of activities are discussed below by room.

1. *Activities Observed in Living Room*

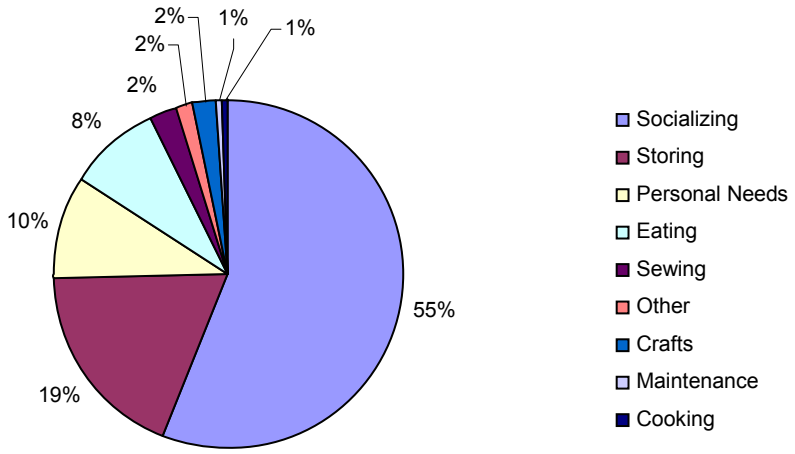
Table 2 indicates that socializing (55%) is the most frequently occurring category of activity observed in living rooms. This is followed by storing (19%), personal needs (10%), and eating (8%). Rounding out these observations are sewing, crafts, other (all 2%), and maintenance and cooking (both 1%). On the surface, this might seem similar to what one would expect to see in the living room of a Euro-Canadian family. An examination of the subcategories of activity listed in Table 2, however, reveals a number of important differences.

Within the category of socializing, watching television, visiting with family and friends, and

Table 1. Categories of domestic activity.

Cooking	a) Char b) Caribou c) Seal d) Beluga e) Bear f) Narwhal g) Bannock h) Cooking Marrow. i) Northern Store Food. j) Miscellaneous Country Food.
Sewing	a) Hide b) Cloth.
Crafts	a) Carving. b) Jewelry c) Wall Hangings d) Doll Making e) Miscellaneous.
Maintenance	a) Honda. b) Snow Machine. c) Boat. d) Fishing Nets. e) Rifle. f) Komatiks. g) Miscellaneous.
Socializing	a) Watching TV b) Playing with Children. c) Visiting with Family and Friends. d) Eating Country Food with Family. e) Talking on CB Radio f) Listening to Radio Station. g) Smoking/Chewing Tobacco. h) Drum Dancing*
Other	a) Using Computer b) Operating Small Business.
Hunting/Fishing	a) Butchering Animals. b) Cleaning Char. c) Drying Char d) Preparing Hides. e) Making Dry Meat. f) Splitting Bone for Marrow.
Eating	a) Caribou Meat b) Dried Caribou Meat c) Char d) Dried Char e) Beluga f) Narwhal g) Bannock h) Country Food i) Tea/Coffee j) Store-bought food.
Storing	a) Hides/Hide Clothing. b) Store Bought Clothing. c) Hunting Equipment d) Sewing Equipment. e) Tools. f) Toys. g) Caribou Meat h) Char i) Bird Eggs. j) Sea Mammal k) Northern store food. l) Large Cooking Pots m) Misc.
Personal Needs	a) Sleeping. b) Washing Up. c) Brushing Teeth. d) Laundry

Table 2. Activities and actions at location (L) - Living Room.



Activity	Action	Location
Socializing	Watching TV	30
Socializing	Visiting with family/friends	30
Storing	Store-bought clothing	19
Personal Needs	Sleeping	15
Socializing	Playing with Children	11
Storing	Toys	9
Socializing	Listening to Radio	8
Socializing	Talking on CB Radio	7
Eating	Country Food	6
Socializing	Smoking/Chewing Tobacco	5
Eating	Store-bought food	3
Sewing	Store-bought clothing	2
Eating	Tea/Coffee	2
Other	Operating small business	2
Crafts	Jewelry	1
Crafts	Doll Making	1
Eating	Traditional food	1
Eating	Dried Caribou Meat	1
Crafts	Carving	1
Eating	Drinking coffee	1
Maintenance	Misc.	1

Other	Using Computer	1
Cooking	Northern store food	1
Sewing	Cloth	1
Sewing	Hides/Hide Clothing	1
Socializing	Drum Dancing	1
Storing	Hides/Hide Clothing	1
Storing	Hunting Equipment	1
Storing	Store-bought food	1
Personal Needs	Laundry	1

Figure 4. Families sleeping together in living rooms.

playing with children were the most frequently observed subcategories of activity. In almost all of the households visited, televisions were tuned to local community events programming, even though many families owned satellite dishes. The events that were listed usually included craft sales, bingos, weddings, anniversaries, and christenings. In addition, many houses were characterized by an almost uninterrupted stream of visitors. People would enter the house unannounced and proceed to eat, drink, and converse with family members in the living room. During my stay, it was not uncommon to see most members of the family, including various friends, sitting together in the living room or kitchen engaged in conversation or playing with children. While Inuit families tend to aggregate within one or two central spaces, it is unusual to see more than two people in any one room and any given time in a Euro-Canadian house. This is because Euro-Canadian families tend to disperse throughout the house where they engage in various individual pursuits. A form of 'generational segregation' is especially apparent within Euro-Canadian families, as children and adults spatially separate themselves from one another in order to engage in activities. This does not seem to be the case with Inuit families. Toys scattered

about floors, coupled with frequent play between adults and children also demonstrate that children occupy a central place in the social life of almost every Inuit family (Figure 3). Within the context of an Inuit household, socializing activities such as these are critical for maintaining networks of mutual assistance, and re-affirming social bonds within the extended family. These networks and bonds form an essential component of the economic and social life of the family by providing a means of acquiring labor, equipment, and even food when necessary.

To illustrate, one Inuit consultant spent a considerable amount of time setting, tending, and cleaning her brother in-law's char nets after he was taken ill. I was also told of several hunters in the community who commonly bring back more food than they need so that it can be shared among relatives and other family members who are unable to acquire these foods. Many of the hunters I met would also regularly lend out their ATC's, rifles, and boats to needy relatives so that they could provide for their families.

The next most frequently observed sub-category of activity involved the storage of household items. Many living rooms were filled with shelves for storing such items as sewing equipment, clothing, and children's toys. In fact, it was not unusual to see every available surface covered with household items. Overcrowding in houses, coupled with the absence of adequate storage space, means that items must be stored wherever possible. When asked what type of storage space improvements they would like to see, most Inuit respondents requested larger insulated cold porches with sturdy shelving.

Within the subcategory of personal needs, a large number of cases were observed in which family members slept in the living rooms of their houses, either individually or together as a unit (Figure 4). In many houses it was not uncommon to see a mattress on the living room floor. A number of reasons were given for this practice. Some families simply expressed a preference for sleeping together. As one consultant explained to me, "Inuit families are stronger than southern ones" and, because of this, her own family had slept together in a single room when her children were younger. Now that her daughters have grown up, they continue this practice with their own

children. Living rooms are ideally suited to this purpose because they are typically the largest spaces in the house. Other Inuit explained to me that second floor bedrooms in two-storey houses are often too hot in the summer, making the first floor living room a much cooler place to sleep. In general, the sleeping arrangements of the Inuit families I visited were also much more flexible than those of a Euro-Canadian family. For example, there might be times when families would sleep together in a single location, and other times when they would sleep in separate rooms either alone or in combination (i.e. mothers sleeping with young children).

Other activities that were observed in the living rooms of Inuit families in relatively low frequencies include craft making, the sewing of hide and cloth, the eating of store-bought and country food, and talking on the CB radio. The low frequencies of crafts such as carving and the sewing of hides and cloth likely relates to their incompatibility with socializing activities. Carving requires a large amount of space and is a noisy and messy activity that produces a great deal of dust, posing a potential health risk to family members. Sewing also requires a great deal of space because it involves the use of specialized equipment such as sergers and sewing machines. In addition, sewing is an activity that requires concentration, making it difficult to do in areas associated with noise and distraction. Many consultants explained to me that the air in their houses was often too warm and dry to sew hides because it caused them to crack. The sewing of hides was usually done in cold porches, or in the crawl space below the house[3]. In one instance, I was told that, during the winter months, women would occasionally turn the heat down in their houses. Once the temperature was cool enough, a group of women would then sit in the living room and sew as many hides as they could. At least one case was related to me where the living room of a house had been used to stage a traditional drum dance. While the use of houses for drum dancing was much more common in the 1960s and 1970s than it is today, I was nevertheless invited to attend one held at the house of an Inuit consultant. Today, such events are

[3] The floor area of the crawl space roughly corresponds to the floor area of the house, and is used to store the septic and water tanks. It is approximately 4ft in height, thereby requiring that a person working in the space assume a crouched position.

Figure 5. Softening dried caribou meat.

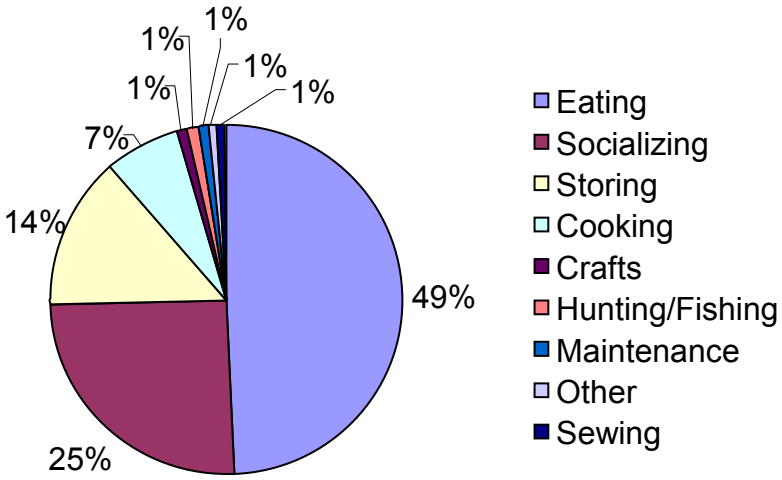
more commonly staged at the local community center because drum dancing often resulted in damage to living room floors.

2. *Activities Observed in Kitchen*

Table 3 indicates that the most frequently observed category of activity in the kitchens of Inuit families was eating (49%). This was followed by socializing (25%), storing (14%), and cooking (7%). Other activities accounted for 1% each and included hunting/fishing, maintenance, sewing, and other. Within the category of eating, the consumption of dried caribou meat and the drinking of tea and coffee were the most frequently observed subcategories of activity. In all Inuit cultures, family and friends are expected to help themselves to these items whenever they like. As a result, they often serve as a focal point for socializing, which is the second most frequently observed category of activity in kitchen areas.

Dried caribou meat is usually prepared at camps and brought back to the community for consumption. In the majority of houses I visited, dried meat was kept in a container on a square of wood or cardboard on the kitchen floor, with a large rock, axe, and ulu or regular kitchen knife

Table 3. Activities and actions at location (K) - Kitchen.



Activity	Action	Location
Eating	Dried Caribou Meat	18
Eating	Tea/Coffee	14
Socializing	Visiting with family/friends	12
Eating	Country Food	7
Socializing	Playing with Children	5
Storing	Store-bought clothing	5
Eating	Store-bought food	4
Cooking	Northern store food	4
Socializing	Listening to Radio	4
Eating	Dried Char	3
Eating	Char	3
Socializing	Eating country food with family	3
Socializing	Talking on CB Radio	3
Storing	Bird Eggs	2
Storing	Large cooking pots	2
Cooking	Caribou Meat	2
Socializing	Smoking/Chewing Tobacco	2
Eating	Drinking coffee	1
Maintenance	Honda	1
Eating	Caribou Meat	1
Eating	Beluga	1
Eating	Bannock	1
Crafts	Jewelry	1

Cooking	Miscellaneous Country Food	1
Eating	Eggs	1
Eating	Fresh Char	1
Cooking	Caribou	1
Hunting/Fishing	Drying Char	1
Storing	Toys	1
Other	Using Computer	1
Sewing	Cloth	1
Storing	Char	1
Storing	Dried Caribou Meat	1
Storing	Hides/Hide Clothing	1
Storing	Northern store food	1
Storing	Sea Mammals	1
Storing	Tools	1
Eating	Traditional food	1

Figure 6. Family eating narwhal muktuk on kitchen floor.

placed close by. A person would cut a piece of dry meat, lay it on top of the rock, and soften the meat by pounding it with a hammer (Figure 5). This practice made chewing easier for young children, as well as adults with dental problems.

I observed Inuit families preparing and consuming other forms of traditional food, including beluga and narwhal muktuk, dried char, tern eggs, bannock, and boiled caribou. Non-traditional or store-bought foods consumed by families included various pre-packaged dinners, soft drinks, potato chips, and candy.

Interestingly, while non- traditional food is always eaten at the kitchen table, traditional food is always eaten on the kitchen floor (Figure 6). The reasons given for this practice are at least partially functional. Traditional foods like muktuk and caribou meat are often heavy and take up a lot of space. In addition, the practice of softening dried caribou meat with a hammer would quickly damage a kitchen table, making the floor a much more suitable location.

Figure 7. Inadequate storage space for large cooking pots.

Finally, the number of people that gather for family dinners is often too large to sit around a kitchen table. The kitchen areas in Euro-Canadian houses are usually not large enough to accommodate these communal family dinners. In response, people will remove all of the furniture from the kitchen. If the space is still too small, food will be consumed on the living room floor. In anticipation of these activities, the furniture in the living rooms of many Inuit families was usually placed against the wall, thereby maximizing the amount of open space available. Quite often the spatial demands of these types of gatherings required that they be hosted by a member of the extended family with the largest house.

Another subcategory of activity observed in kitchens was the storing of various items. The large cooking pots necessary for boiling caribou meat are often difficult to store because kitchen cupboards are too small, having been designed to accommodate much smaller cookware (Figure 7). As a result, these large pots are often placed in the corner of the kitchen where they take up valuable floor space.

In several instances, people in kitchen areas were listening to either the community radio station

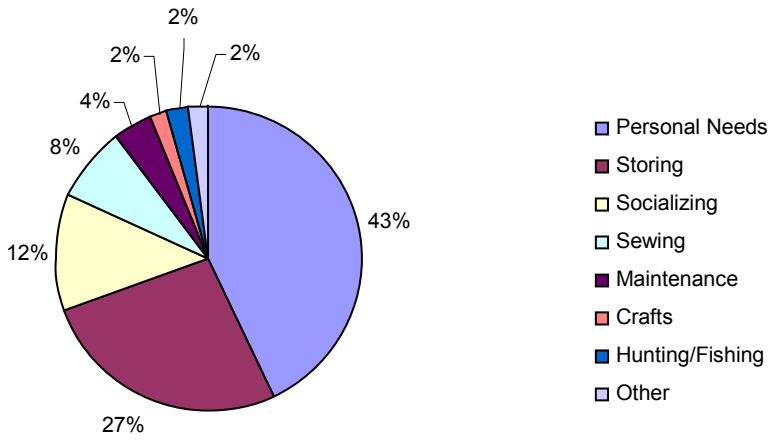
or CB radio. Almost every house I entered had a CB radio which was usually left on during the day. I was told that people used these radios to keep in touch with what was going on at hunting camps and elsewhere in the community.

I observed at least one case in which a kitchen area was used for the repairing of an ATC engine, although many consultants explained to me that people no longer did this type of work in houses. Instead, unheated shacks constructed from packing materials and scrap lumber were commonly built behind the house for use as workshops.

3. Activities Observed in Bedrooms

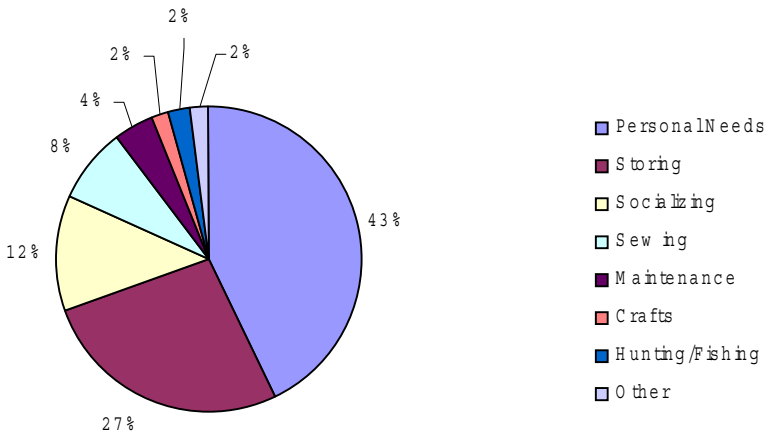
Table 4 reveals that activities centered on satisfying personal needs such as sleeping were the most frequently occurring activities associated with bedrooms (43%). This was followed by storing (27%), socializing (12%), sewing (8%), and maintenance (4%). Activities observed in bedrooms were rounded out by crafts, hunting/fishing, and other, all at 2%. When not sleeping in living rooms, families either slept together as a unit in a single bedroom, or apart with parents and younger children sleeping together in one room, and older children sleeping in another. When not used for sleeping, bedrooms functioned as children's play areas, storage areas and, in a few cases, as workshops for sewing, crafts, or the repair and maintenance of hunting equipment. In order to accommodate these activities, mattresses were placed upright against one wall of the room. In some instances, families who slept together in a single bedroom, or whose grown children had moved out, utilized empty bedrooms as workshops. One individual I visited had brought a 4ft x 8ft piece of plywood into an empty bedroom to serve as a working surface for the cleaning and repairing of hunting equipment and engine parts, as well as for carving ivory. Items I observed in this workspace included grinders, two rifles, propane, and various solvents for cleaning engine parts.

Table 4. Activities and actions at location (B) - Bedroom.



Activity	Action	Location
Personal Needs	Sleeping	19
Storing	Store-bought clothing	6
Storing	Toys	3
Sewing	Cloth	3
Socializing	Watching TV	2
Personal Needs	Laundry	2
Socializing	Playing with Children	1
Hunting/Fishing	Preparing Hides	1
Maintenance	Miscellaneous	1
Maintenance	Rifle	1
Other	Using Computer	1
Crafts	Carving	1
Socializing	Listening to Radio	1
Socializing	Talking on CB Radio	1
Socializing	Video games	1
Storing	Clothing	1
Storing	Misc. items	1
Storing	Miscellaneous	1
Storing	Tools	1
Sewing	Store-bought clothing	1

Table 4. Activities and actions at location (B) - Bedroom.



Activity	Action	Location
Personal Needs	Sleeping	19
Storing	Store-bought clothing	6
Storing	Toys	3
Sewing	Cloth	3
Socializing	Watching TV	2
Personal Needs	Laundry	2
Socializing	Playing with Children	1
Hunting/Fishing	Preparing Hides	1
Maintenance	Miscellaneous	1
Maintenance	Rifle	1
Other	Using Computer	1
Crafts	Carving	1
Socializing	Listening to Radio	1
Socializing	Talking on CB Radio	1
Socializing	Video games	1
Storing	Clothing	1
Storing	Misc. items	1
Storing	Miscellaneous	1
Storing	Tools	1
Sewing	Store-bought clothing	1

Figure 8. A women's sewing area in converted bedroom.

He explained that he had done this because the outside shed he usually used had to be torn down as his dogs had over wintered there the previous year.

In other instances, spare bedrooms were utilized by women as sewing rooms (Figure 8). Sewing is an important source of cultural identity for Caribou Inuit (Padleirmiut) women, many of whom are extremely skilled seamstresses. One Inuit consultant explained to me that windproof and waterproof clothing that resists the build up of condensation is essential for hunting on the land. Many hunters recognize that store-bought clothing is inferior to that which can be made by hand. As a result, many Padleirmiut women continue to sew tailored clothing for immediate family members and relatives. A consultant told me that the one rule in his house is that once his wife starts sewing she is not to be disturbed, likely reflecting the high degree of concentration that is required to do skilled work of this nature. When a man and woman share a common workspace, I was told that sewing always takes precedence over other activities. As a result, a man will reschedule his activities to accommodate those of his wife. Other types of activities observed in bedroom workshops included the manufacturing of earrings, picture frames, and wooden clocks – all of which were sold to either visitors from the south, or other Inuit families in the community.

Figure 9. Items stored in crowded cold porch.

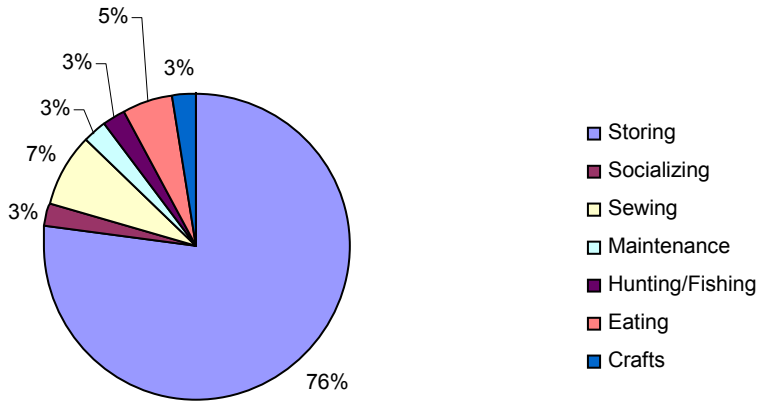
4. *Activities Observed in Cold Porches*

Not surprisingly, Table 5 indicates that storing accounted for 76% of the activities observed in cold porches. This was followed by sewing (7%), eating (5%), and socializing, maintenance, crafts, and hunting/fishing activities (3%).

The land-based economy[4] of many Inuit families in Arviat requires a great deal of equipment, all of which must be stored when not in use. This equipment may include char nets, rifles, gas, clothing, helmets for ATC's, float suits and life jackets for boating, Hides and hide clothing must also be kept cool all year round in order to prevent them from deteriorating. In addition, meat acquired from hunting must be stored in large deep freezes. The cold porch is an open vestibule attached to the front and/or rear door of the house, and therefore serves as an ideal location for the storage of these types of items. In many of the houses I visited the cold porch housed the family's deep freezer, served as a workshop for carving and the preparation and sewing of hides, and as a

[4] Land-based economies are those which rely heavily on the hunting and gathering of wild resources.

Table 5. Activities and actions at location (CP) - Cold Porch.



Activity	Action	Location
Storing	Store-bought clothing	11
Storing	Hides/Hide Clothing	9
Storing	Toys	3
Storing	Hunting Equipment	3
Sewing	Hides/Hide Clothing	3
Storing	Tools	2
Storing	Country Food	1
Storing	Clothing	1
Socializing	Smoking/Chewing Tobacco	1
Maintenance	Engine Repair	1
Hunting/Fishing	Preparing Hides	1
Eating	Dried Char	1
Eating	Dried Caribou Meat	1
Crafts	Carving	1

storage area for a wide range of items including kamiks (boots) and gloves made from caribou hide and seal skin. As many families are now aware that smoking indoors can harm young children, the cold porch also serves as a sheltered smoking area.

Many of the respondents I talked to complained that their cold porches were too small to serve as adequate storage or work areas. Furthermore, most of the new multiplex apartments lack cold porches, creating storage problems for their Inuit residents. I was told of at least three occasions in which items left outside of the house or near the doorway had been stolen. These items usually included snow shovels, bicycles, and children's toys. Many families had resorted to keeping these items inside the hallways of their homes, effectively blocking exits and creating fire hazards. Occasionally, families will use cold porches for cooking. One Elder explained to me that she cooks bannock on the cold porch of her house because her children do not like the smell.

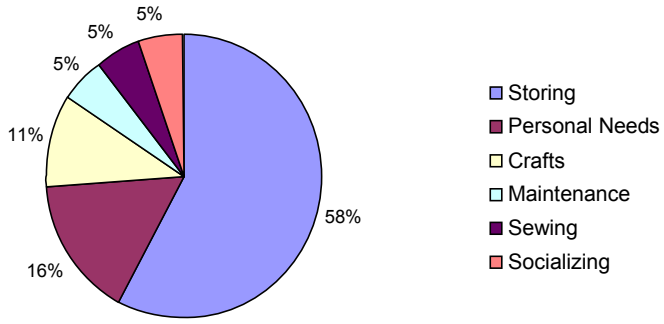
5. *Activities Observed in Utility Rooms.*

Utility rooms are small rooms within the house that usually contain the water tank, sewage tank, furnace and, in some cases, washer/dryers. Table 6 illustrates that few activities were observed in these locations. Most activities seemed to focus on the storing of clothes, toys, food, and hunting equipment (58%), as well as personal needs such as laundry (16%). In at least one instance, the utility room also served as a location for smoking and chewing tobacco.

6. *Activities Observed in Storage Room.*

As with the utility room, few activities were observed in the storage rooms of the houses I visited . In several cases, these rooms served as office work areas for the operation of small businesses. For example, one consultant operated his taxi service and rented out instructional guitar videos from the storage room in his house. In another instance, an individual had turned a storage room into a small craft area where he made clocks. I also observed a few storage rooms that served as sewing areas for women.

Table 6 . Activities and actions at location (U) - Utility Room.



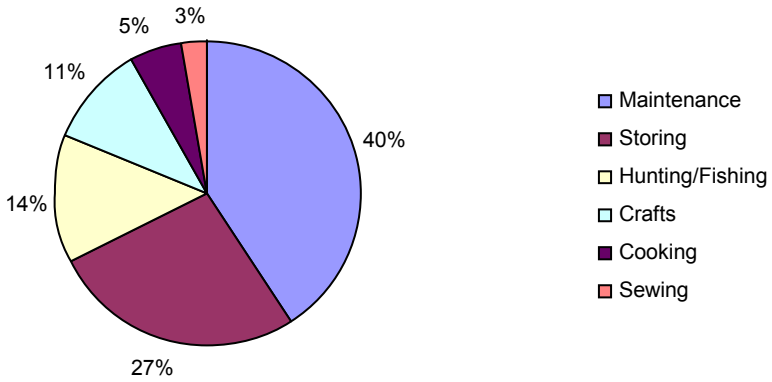
Activity	Action	Location
Storing	Store-bought clothing	3
Personal Needs	Laundry	3
Storing	Caribou Meat	2
Storing	Toys	1
Storing	Sea Mammals	1
Storing	Hunting Equipment	1
Storing	Country Food	1
Storing	Clothing	1
Storing	Char	1
Socializing	Smoking/Chewing Tobacco	1
Sewing	Store-bought clothing	1
Maintenance	Misc.	1
Crafts	Miscellaneous	1
Crafts	Carving	1

7. Activities Observed Outside the House

A number of domestic activities that are important to Inuit families cannot be performed inside houses because they are inherently messy, noisy, or require large open work spaces (Table 7). In many instances, these types of activities are either completed in the open air, or inside work shacks constructed from packing crates and scrap lumber. The category of activity most frequently observed outside of houses involved the maintenance of hunting and fishing equipment (40%). This was followed by hunting and fishing activities such as the preparation of hides (14%), craft activities such as carving (11%), cooking and eating of traditional food (5%), and sewing caribou hide and seal skin clothing (3%). The most frequently observed sub-category of activity involved the repair and maintenance of ATC's, boats, snow machines, and komatiks (wooden sleds). The ability to travel on the land is an essential component of the economies of many Inuit families. Consequently, these items constitute critical forms of warm season transportation in Arviat. The engines, tires, and suspension systems of ATC's and snow machines require almost constant maintenance to ensure safe and efficient travel to and from camps and other hunting/fishing locations (Figure 10). In many cases, Inuit hunters will make modifications to ATC's in order to better suit their needs. People often carry up to 3 or 4 caribou on the racks of an ATC after the animals have been butchered. The head is removed as are the limbs, and the rib cage is then separated from the pelvic girdle. These butchering units are then strapped to the racks of the Honda. One consultant explained to me that the newer Honda ATC's have frames that are not strong enough to support such heavy weights, and regularly buckle under their loads. As a result, people will reinforce the frames of their ATC's by welding iron bars on critical parts of the frame.

The maintenance of ATC's and boats is usually conducted outside the house, or in small unheated sheds (Figure 10).

Table 7. Activities and actions at location (O) - Outside.



Activity	Action	Location
Maintenance	Honda	6
Maintenance	Miscellaneous	5
Crafts	Carving	3
Hunting/Fishing	Preparing Hides	3
Storing	Caribou Meat	2
Storing	Storing Meat	2
Cooking	Caribou	1
Crafts	Jewelry	1
Hunting/Fishing	Butchering Animals	1
Hunting/Fishing	Splitting Bone for Marrow	1
Maintenance	Boat	1
Cooking	Bannock	1
Maintenance	Snowmachine	1
Maintenance	Wooden Komatik	1
Sewing	Hides/Hide Clothing	1
Storing	Char	1
Storing	Country Food	1
Storing	Hides/Hide Clothing	1
Storing	Hunting Equipment	1
Storing	Sea Mammals	1
Storing	Storing Honda	1
Maintenance	Misc.	1

Figure 10. Repairing a Honda ATC outside.

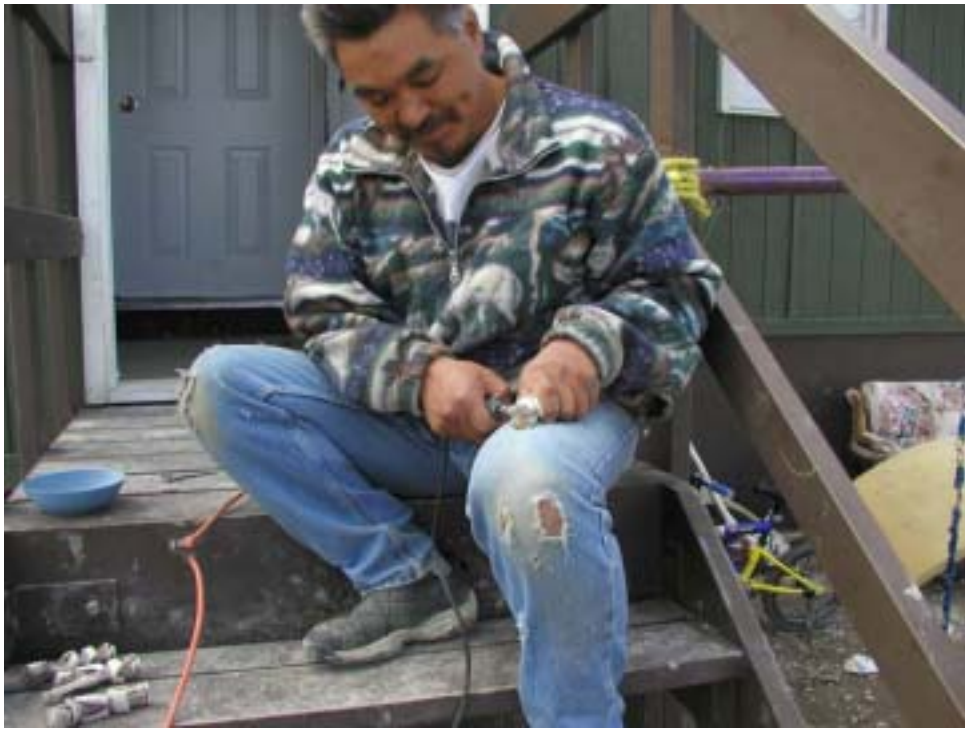


Figure 11. Carving antler on the front steps of a house.

Figure 12. Butchring a black bear outside of house.

However, outside work can be limited by weather conditions and temperature. In addition, several individuals pointed out that standing water around the outsides of houses, coupled with the fact that people often use the areas between houses as shortcuts when driving around the community, often interfere with these important activities. As a result, several people I met in the community have made arrangements with others who owned work sheds to use them on occasion. In one case, an individual bought a small parcel of land on the edge of the community from the Hamlet so that he could build a workshop for maintenance and craft activities. This was because the areas outside his one bedroom four-plex apartment were commonly used as ATC shortcuts by others living in the area. Another activity which was frequently observed outside houses was the carving of soapstone, bone, antler, and ivory (Figure 11). Many carvers recognize that the dust resulting from their activities places family members at risk and can block furnaces. As a result, carving activities are usually performed on the steps outside the house, in the open air, or in an

Figure 13. Butchering meat for storage outside of house.

unheated shack. Many carvers have constructed special installations such as work benches beside their houses. I observed carvers working outside in all sorts of weather, demonstrating that carving is an important source of income for many families.

I also observed numerous examples of the use of outside areas for the cleaning of char nets and the preparation and drying of hides. During my stay in Arviat, a black bear had been shot a few kilometers from the community by the brother of one Inuit consultant. When I arrived, the bear was laid out on top of a large wooden crate outside their house (Figure 12). My consultant's mother was in the process of separating the meat from the hide using a large ulu, which she had to repeatedly sharpen. She told me that the hide was to be used for mittens and perhaps a pair of pants, while the meat would be eaten. On another occasion I observed this same individual preparing a seal hide. She had set up a piece of plywood at the side of the house and was scraping the hide. She then rinsed it with water and hung it from the railing of the porch using bungee cords to suspend the hide. The tool she used to scrape the seal skin was originally made and used

by her grandmother and had been passed down to her. Once dried, the hide would be placed onto a board and softened by jumping on it repeatedly.

Traditional foods such as char and caribou are often stored, prepared, and sometimes eaten outside of the house (Figure 13). In many cases, a meat storage rack had been constructed around the side or back of the house so that caribou meat could be kept away from the dogs. The meat is usually covered by a tarpaulin to protect it from insects and the elements. The outside of one house in particular resembled a traditional caribou hunting camp. Several discrete activity areas were apparent, with stacks of scraped hides piled neatly in one location, stacks of dried and fresh meat at another, and large cooking pots made from converted 40-gallon oil drums at yet another. As mentioned previously, boiling is the primary way that Inuit families cook meat in Arviat. Animals like caribou are often butchered into large cuts that require large pots. The burners on small electric stoves are simply not hot enough to efficiently bring these large pots of meat to boiling point and often result in large electrical bills. In addition, boiling large pots of meat in houses produces a great deal of humidity that can cause damage to walls, floor joists, and insulation. To illustrate, I visited several older houses in the community that were in the process of being retrofitted. Once stripped down to the frame, the insulation removed from these houses was often black with mold and mildew caused by excessive moisture. As a result, at least some Inuit families boil meat outside of their houses using small fires. Given that the spacing between houses is approximately 12 meters, this practice likely constitutes a fire hazard.

B. Constructing Configurational Descriptions of Euro-Canadian Houses

A walk around the community of Arviat provides one with an opportunity to view the entire history of northern housing in the Post-War era and illustrates the wide variety of architectural forms currently in use. While rare, early designs like the one room “matchbox” houses of the 1950s still exist in Arviat, but now only function as storage sheds or workshops. Houses designed and built in the 1960s and 1970s continue to serve as rental family housing, but require regular retrofitting and upgrading. Within the last several decades, both detached and apartment-style row

housing has been built for use by Inuit families in various rental and home ownership assistance programs. How have the floor plans of these houses changed over the last four decades? Do these changes reflect changes in Euro-Canadian family structure over this time period? Are these changes suited to the cultural values and lifestyles of Inuit families?

In order to answer these questions, Space Syntax software was used to generate configurational descriptions of the spatial geometry of the floor plans of house models currently used in Arviat. These configurational descriptions allow the researcher to map how integration is distributed within the dwelling according to how accessible or visible a space is. The locations of activities performed by Inuit families, outlined in the first section of this report, can then be transposed onto the processed floor plans. This provides a means of understanding how activities are sequenced within the house according to the integration values of the rooms within which they most frequently occur. This provides a method for quantifying and comparing the patterns of housekeeping practiced by Inuit families.

As discussed previously, space syntax research has revealed that integration is the primary way in which houses communicate cultural information through space. A measure called relative asymmetry can be calculated to determine how integration is distributed throughout the structure. This provides the researcher with a numerical means of comparing the configurational descriptions of different types of structures (Blanton (1994:50-64; Hillier and Hanson 1984: 108-140). Relative asymmetry is determined by calculating the relative differences in "trip" lengths it takes to move from one space to all other spaces in the dwelling. This principal is reflected in Figure 14 in which the JP map of a simple house has been drawn from the perspective of two different spaces. The different ways in which spaces 3 and 11 are connected to other spaces in the

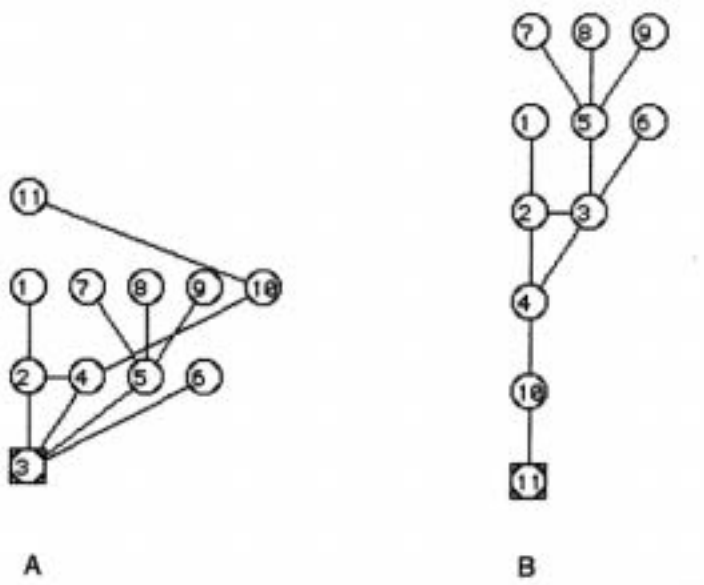


Figure 14. Justified permeability (JP) graph drawn from the perspective of two different spaces.

configuration changes the depth and symmetry of each graph. As a result, "trips" taken from space 11 to all other spaces in the structure vary much more in length than trips taken from space 3. This has the effect of making space 11 less accessible to a person moving through the dwelling than space 3. Relative asymmetry can be expressed mathematically in the following equation:

$$RA = \frac{2(MD - 1)}{k - 2}$$

The mean depth (MD) of each space is calculated by assigning every other space a depth value, based on the trip lengths taken to move from the current space to all others in the dwelling. These trip lengths are then summed and divided by the total number of spaces (k) in the house less one (the current space). Because RA values differ considerably across dwellings of different sizes, it is necessary to convert them into a measure of real relative asymmetry (RRA) using a constant provided by Hillier and Hanson (1984: 112). The resulting RRA values are either greater than or

less than 1, with higher values indicating a greater asymmetry or differences in spatial accessibility. RRA values can be calculated using *Netbox* and graphically displayed using *Pesh* – two computer programs developed specifically for space syntax research.

JP graphs for the house models occupied by the Inuit families participating in this study are presented in Figures 15 to 17. In these graphs, rooms are represented as circles and points of access such as corridors and doorways are represented as lines. The graphs provide a visual means of examining how house models vary in the ways in which spaces are connected together. For example, representing the Coldstream 3-bedroom house are longer (deeper) and narrower (non-distributed) than graphs representing the Access 4-bedroom house, which are shorter (shallower) and wider (distributed). Integration is sequenced differently in the Coldstream house because integration values vary to a much greater degree. This is due to the fact that there are fewer rooms occupying similar positions in the configuration, as is the case with the Access house in which eight rooms all occur at the same depth and are connected to the same space.

2D convex analysis offers a more visual means of examining the sequencing of integration. In Figures 18 to 20, the floor plans of each house model used in the study are broken up into discrete bounded spaces (rooms) that are connected together by points of entrance and exit. The connections between spaces are then processed using *Pesh* and color-coded according to their integration values: from red (most integrated) all the way down the color spectrum to blue (least integrated). Like the JP graphs, the processed convex break-ups in Figures 21 to 23 also reveal that the integration values of rooms vary across various models. For example, while living rooms are coded red (highly integrated) in some houses, they appear orange and yellow (less integrated) in others. These differences are a direct function of the different positions rooms occupy within the overall spatial configuration of the house.

In Figure 24, the integration values for seven rooms were averaged across the sample of houses and plotted on an XY graph. The size of each bubble corresponds with the range of domestic activities that were observed at each location. The graph reveals that, on average, living rooms are

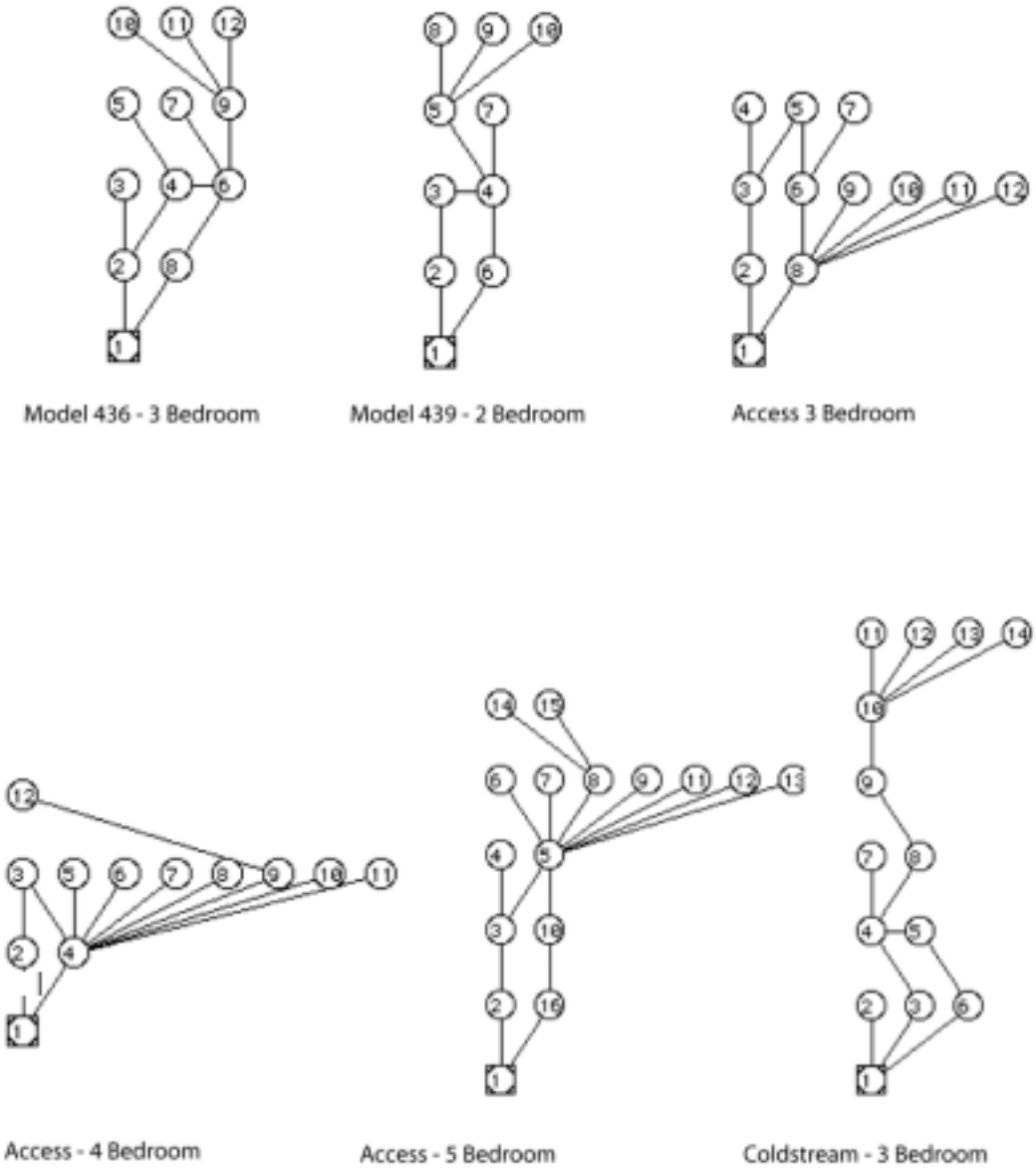
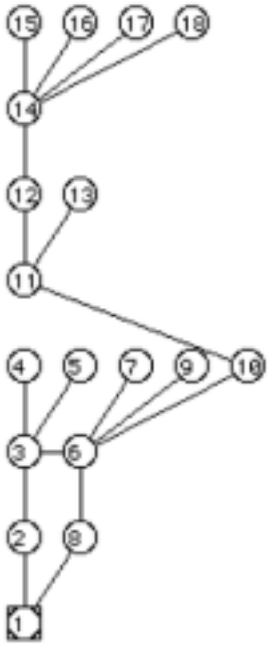
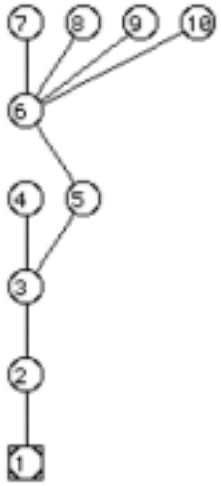


Figure 15. Justified permeability graphs for Arviat houses.

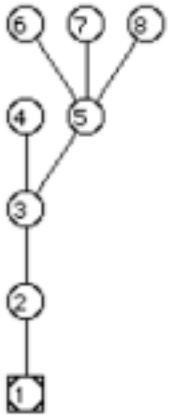
1986 Duplex - 2 Bedroom



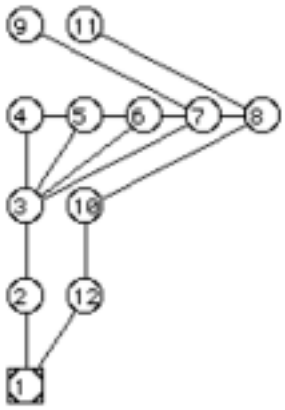
1986 Detached - 4 Bedroom



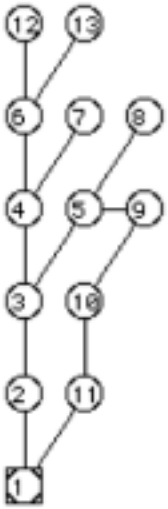
CMHC Experimental House



1985 Fourplex - 1 Bedroom



HAP B One



1978 Weber - 2 Bedroom

Figure 16. Justified permeability graphs for Arviat houses.

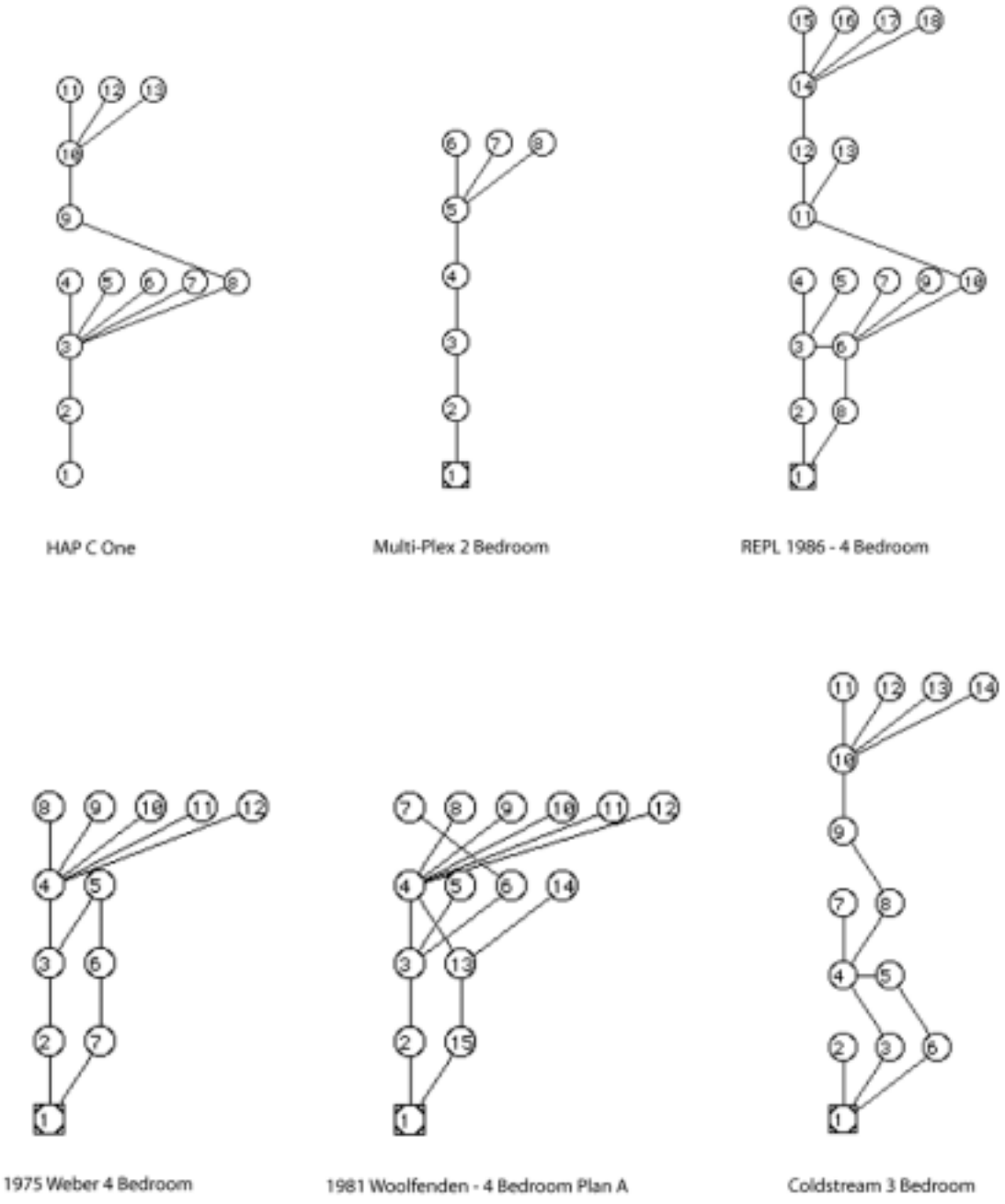
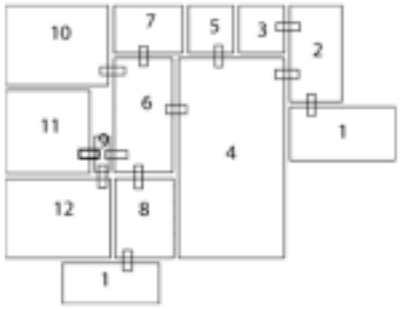
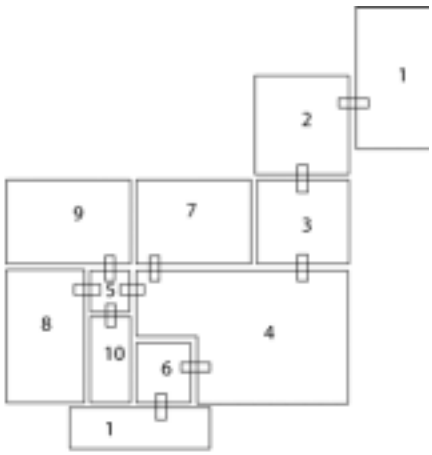


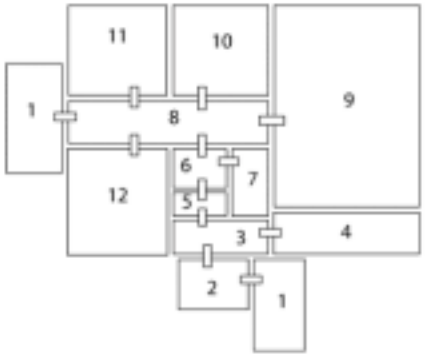
Figure 17. Justified permeability graphs for Arviat houses.



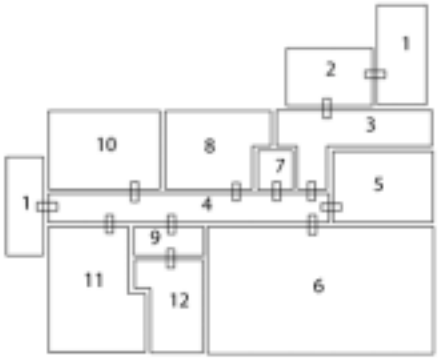
Model 436 - 3 Bedroom



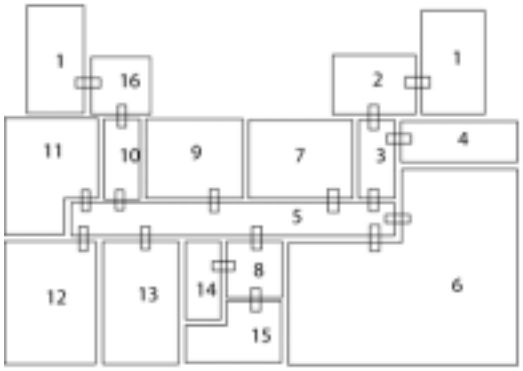
Model 439 - 2 Bedroom



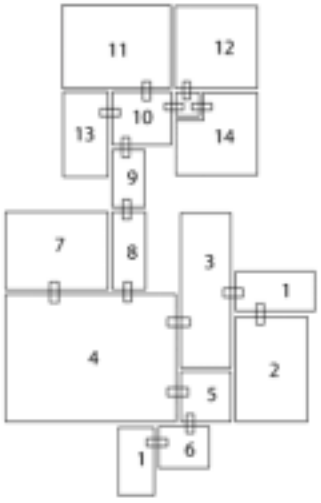
Access 3 Bedroom



Access - 4 Bedroom



Access - 5 Bedroom



Coldstream - 3 Bedroom

Figure 18. 2D Convex break-ups for Arviat houses.

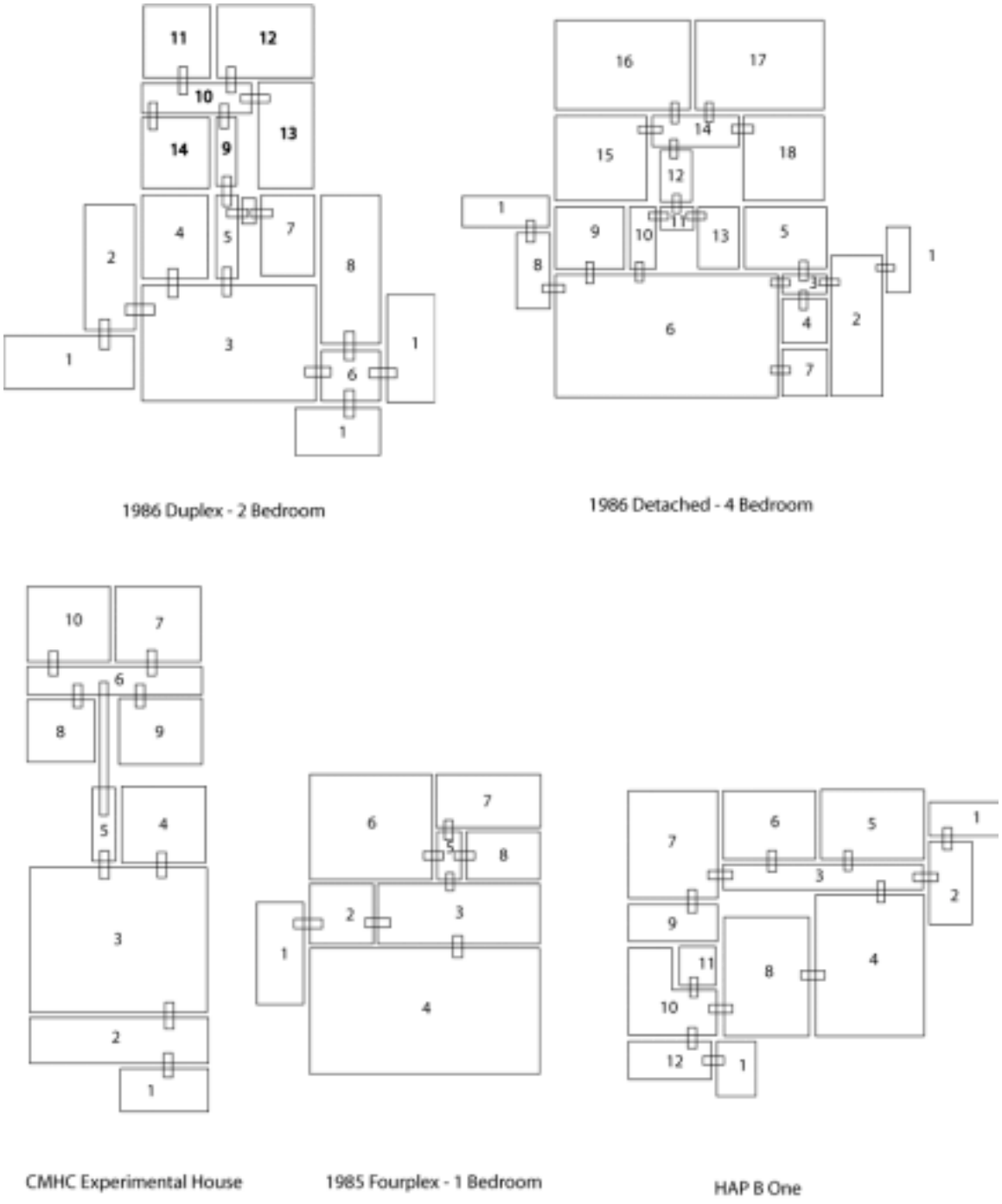


Figure 19. 2D convex break-ups for Arviat houses.

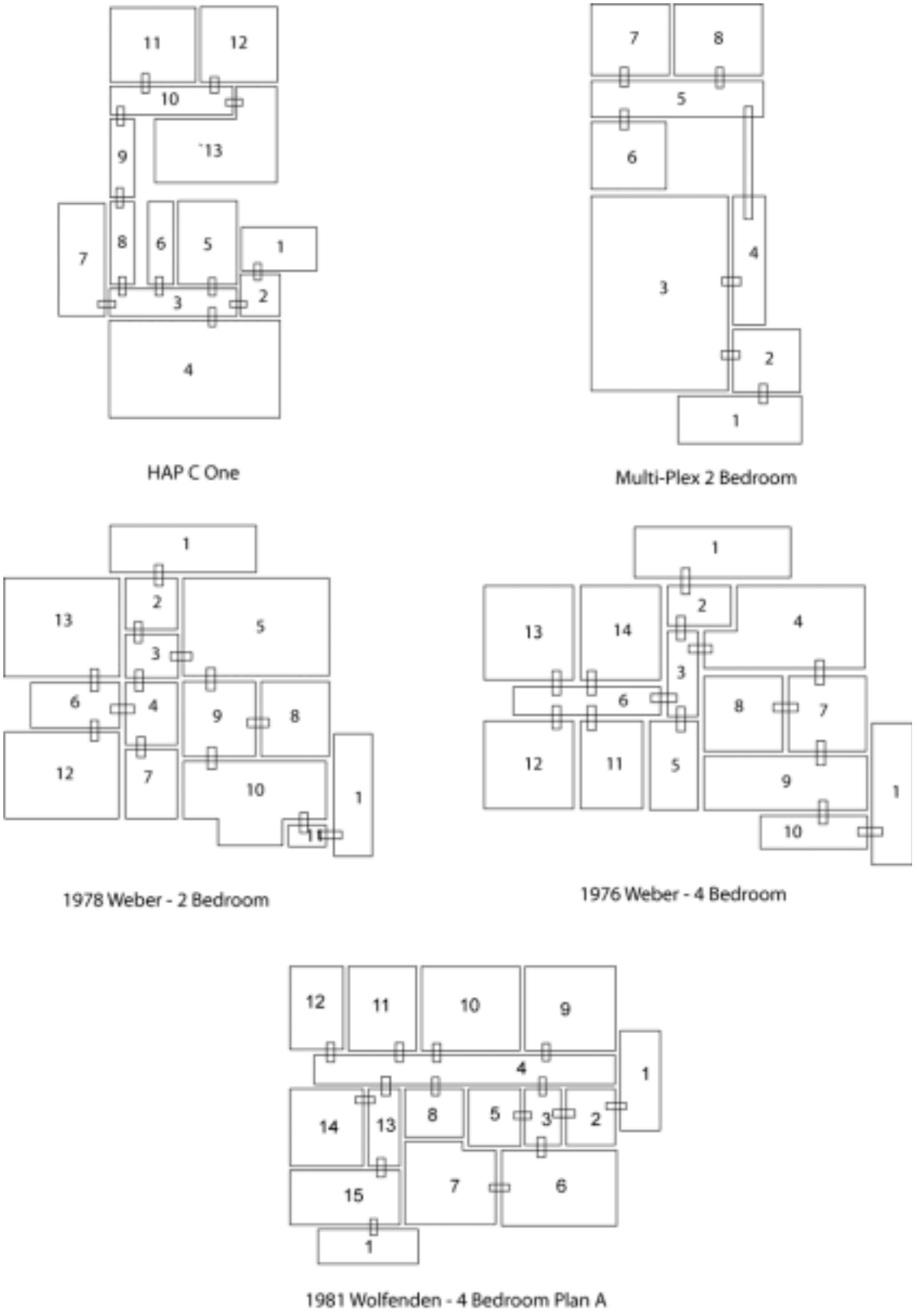


Figure 20. 2D convex break-ups for Arviat houses.

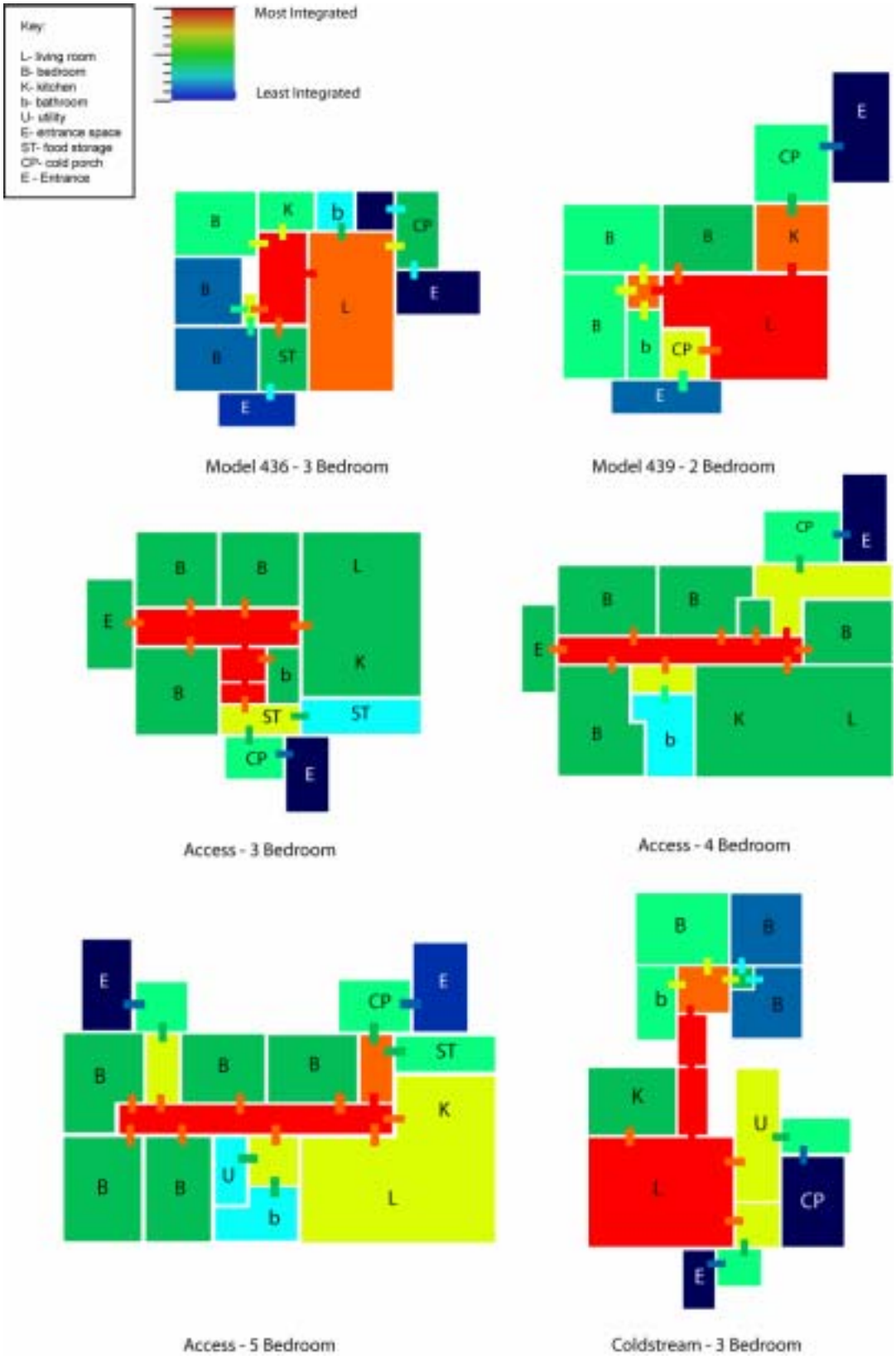


Figure 21. Processed 2D convex maps of Arviat houses.

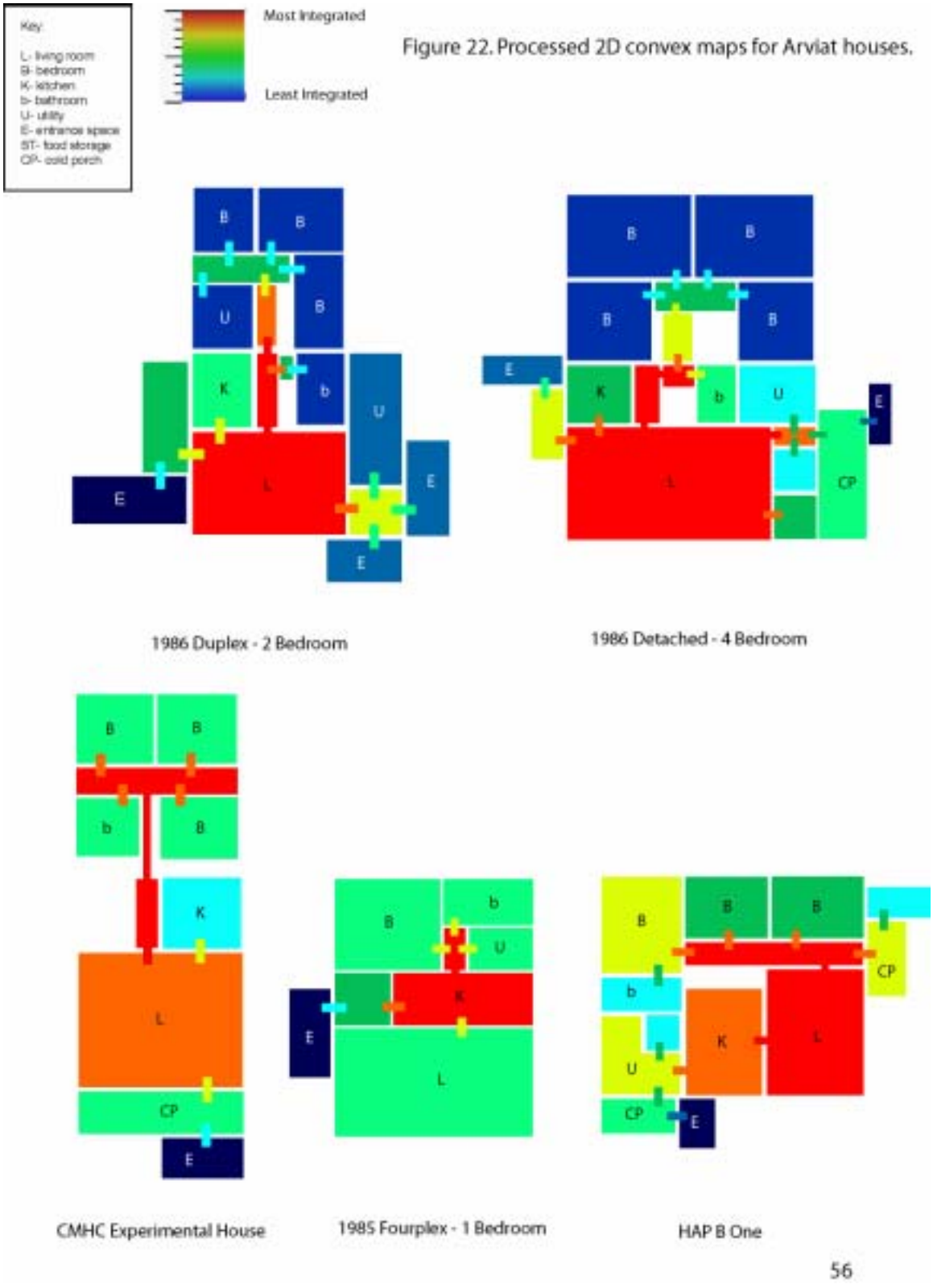


Figure 22. Processed 2D convex maps of Arviat houses.

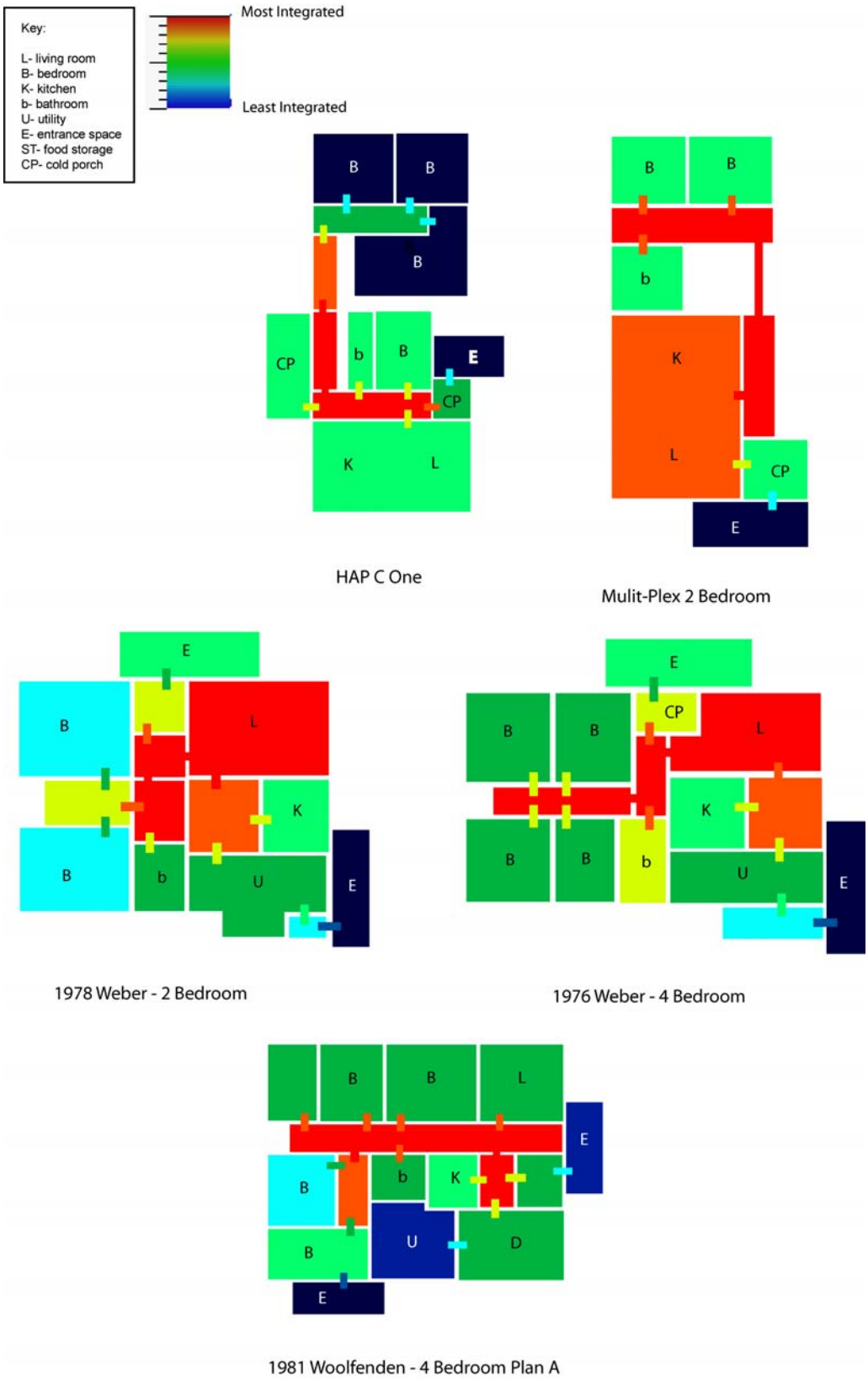


Figure 23. Processed 2D convex maps of Arviat houses.

Figure 24. Locations by Integration

(Bubble Size Represents the Range of Activities Observed at Each Location)

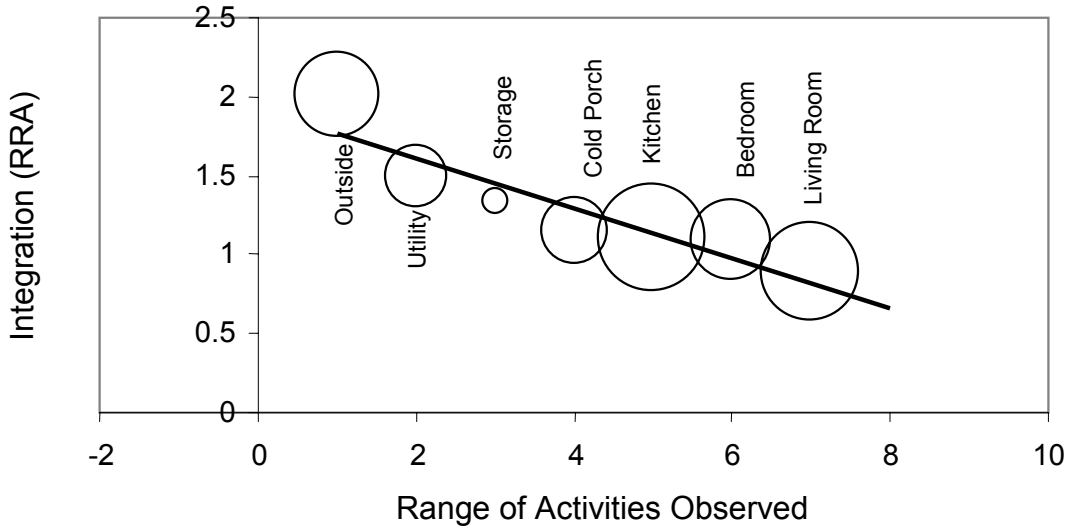


Figure 24. Locations by Integration

Figure 25. Activities Sequenced According to Integration

(Bubble size Represents the Frequency of Occurance)

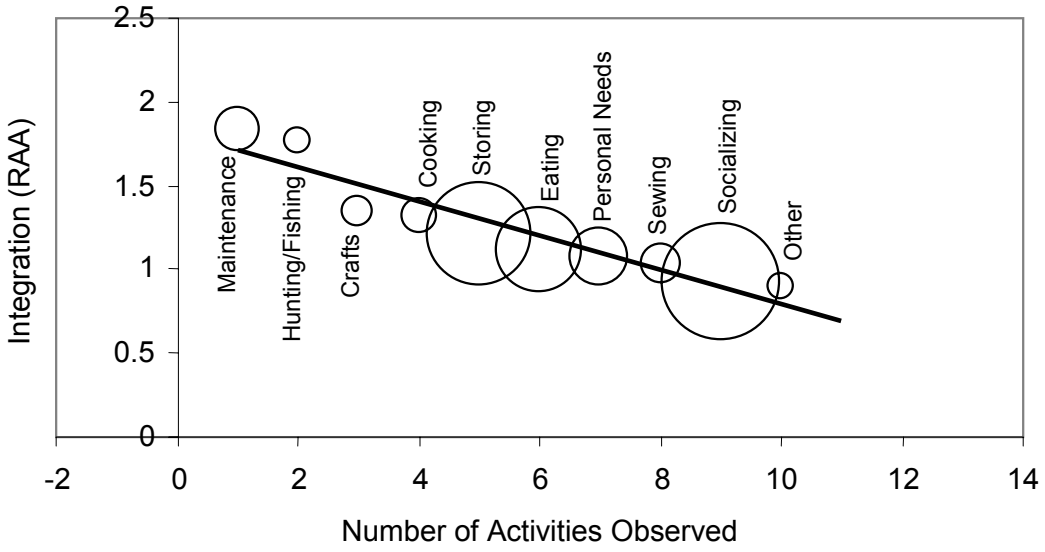


Figure 25. Activities sequenced according to integration.

the most integrated spaces among these houses, followed by bedrooms, kitchens, cold porches, storage rooms, and utility rooms. Furthermore, kitchens were associated with the greatest diversity or range of activities, followed by living rooms, then areas outside the house, bedrooms, cold porches, utility rooms and storage rooms. Figure 25 presents the activities of Inuit families sequenced according to the averaged integration values of the rooms in which they were most frequently observed. The size of the bubble represents the number of times each type of activity was observed during the course of the study. The XY graph reveals that socializing activities tend to occur in the most integrated spaces in the dwelling, and were also the most frequently occurring category of activity. Sewing activities tend to occur in the next most integrated spaces, followed by personal needs, eating, storing, cooking, crafts, hunting/fishing, and maintenance activities. This sequencing seems to be both a reflection of the **mechanical properties** and **social context** of each category of activity, modified by the spatial layouts of Euro-Canadian style houses. Social activities such as visiting with family and friends, child care, playing games, etc, have mechanical properties that require large open areas, and a broad social context that involves small to large groups of people. As a result, it is logical that they would be performed in the most integrated space in the house (the living room). Overall, socializing activities were also the most frequently observed category, which reflects the importance placed in Inuit society on maintaining familial ties and networks of mutual assistance.

Sewing, on the other hand, is an activity that requires a large work space because of the use of specialized equipment like sewing machines and work benches. It is also an activity that occurs within a narrow social context as it involves a high degree of concentration. The fact that it was often observed in relatively integrated spaces is likely a function of the lack of adequate space for this activity. As a result, it is likely done opportunistically whenever and wherever it can be accommodated. This may also explain why it was so infrequently observed.

In some cases, the occurrence of personal needs activities such as sleeping in highly integrated

areas is a direct reflection of cultural values in Inuit society which stress the solidarity[5] of the family. In other cases, it seems to have been an attempt to escape the discomfort of overly warm temperatures in upstairs bedrooms during the summer months.

Outside of the consumption of traditional country food during family gatherings, eating activities occurred in areas that were midway between integration and segregation. This may be due to the fact that in Inuit society, food is consumed whenever one is hungry and in a variety of locations throughout the house, resulting in a wide range of integration values for this activity. In other cases, this may reflect the fact that some houses lack highly integrated spaces (i.e. kitchens) that are large enough to accommodate the preparation and consumption of traditional food during family gatherings. In these situations, food is eaten in other locations to reduce crowding. The same can be said for storing activities. As mentioned previously, the pursuit of a land-based economy, coupled with overcrowded housing conditions, means that storage space is always at a premium. As a result, items are constantly being stored, removed for use, and restored throughout the house, resulting in a wide range of integration values for this activity.

Cooking activities were infrequently observed relative to other types of activities like eating. The cooking of both traditional and non-traditional food requires specialized equipment such as large pots, stoves or open fires, large cutting surfaces, etc. Furthermore, the mechanical properties of cooking many traditional foods make it a messy activity that often requires a lot of work space. It is also an activity that occurs within a relatively narrow social context as it often demands continuous attention, and can result in heat and/or smells that others sometimes find distasteful. The boiling of caribou meat over open fires to avoid the build up of condensation in houses and high electrical bills, and the cooking of bannock in cold porches because children dislike the smell, are two documented examples of this. The occurrence of cooking in more segregated areas is likely a reflection of such requirements. Foods also tend to be cooked in large batches or eaten

[5] Solidarity refers to the emotional closeness of the family, and the degree to which members participate together in various activities.

fresh (raw), thereby reducing overall preparation time.

The mechanical properties of crafts such as carving also make them a noisy, messy activity. Carving requires a fair amount of space, utilizes specialized and noisy equipment, and generates a large quantity of dust and debris. It is also an activity that occurs within a narrow social context because it requires attentiveness and a large open workspace. These factors likely explain why this activity is commonly situated in poorly integrated spaces.

Like crafts, hunting/fishing activities and maintenance activities also require large amounts of work space, specialized equipment, and are often noisy and messy tasks. Not surprisingly, these activities tend to be situated outside of the house, either in a work shed or out in the open air. These types of activities were not as frequently observed as others because they were usually dependant upon weather, access to the labor and tools of others, etc. As a result, they tended to be performed on an opportunistic and random basis.

C. Visibility Graph Analysis of Selected House Designs from Arviat

So far, we have examined how the domestic activities of Inuit families are sequenced according to the integration values of the rooms within which they most frequently occur. In this case, integration is measured according to the physical accessibility of the room relative to other locations within the house. However, integration can also be examined according to how visible a room and its contents are from other locations within a house.

Visibility graph analysis (VGA) is a technique for examining how the placement of walls and doorways generates viewfields that determine what individuals see as they move through a building. The origins of visibility graph analysis lie in studies of isovists and viewsheds developed in the fields of architecture, urban/landscape planning, and geography. The concept of an isovist is relatively simple and involves the measurement of how much of the volume of an interior space is visible from a series of different locations within a building. This approach is appealing to architects because it provides a method of describing built environments ‘from inside’ and from the point of view of individuals as they perceive it, interact with it, and move

through it (Turner et al 2001:103). Research into isovists indicates that a relationship exists between visibility (what can be seen), permeability (where you can go), and functionality (how the space is used). These three variables have been shown to influence how people navigate through large buildings and where they choose to locate specific activities based on the concepts of "public" and "private" (Hanson 1998:54). To illustrate, large open spaces generate wide viewfields that increase the amount of visual information available to individuals who enter them. Such visual information might include knowing who else is in the house, what activities they are engaged in, and where other entry and exit points lead. As interior partitioning increases, viewfields become progressively more narrow and visual information is lost. Because activities and individuals in other rooms can no longer be easily seen from any one location, individuals must move from room to room in order to acquire visual information about the locations and activities of other inhabitants. The more an individual has to search to acquire such information, the more "private" the dwelling or room becomes. Thus, by placing limits on what and whom one can see, viewfields encode information about culturally mediated patterns of activity segregation and personal privacy.

In order to construct a visibility graph, the floor plan of a building is imported as an Autocadd DXF file into *Depthmap*, a program for performing visibility graph analysis. A network of points is superimposed on the floor plan, forming a grid of locations. The program then attempts to find all the visible locations from each specific grid point. The connectivity of individual locations varies throughout the floor plan relative to the number and location of partitions such as walls. Visible spaces lacking partitions produce more connected locations which are toned "red" by Depthmap. As partitioning increases, spaces become less visible and the connectivity of locations decreases, toning the area towards the blue end of the scale. Unlike other isovist programs in which viewfields are generated from a single point of reference, Depthmap enables one to generate viewfields simultaneously from all locations in the building. The resulting visibility map illustrates how the amount of visual information varies as one moves through the structure.

Once the visibility graph has been processed, a variety of measures can be taken using the analytical features of Depthmap. Measures of integration and clustering coefficient (C_i) were selected for the purposes of this project. Integration varies according to how visible a specific location is from other points in the dwelling. Hence, highly visible areas that are covered by wide viewfields are more visually integrated than less visible areas covered by narrower viewfields. The clustering coefficient measures the proportion of inter-visible space within the visibility area of a point and provides an indication of how much of an observer's visual field is retained or lost as he/she moves away from that point. Low C_i values indicate a loss of visual information as one moves away from a location in any direction, while high C_i values indicate the retention of visual information (Turner et al 2001: 111).

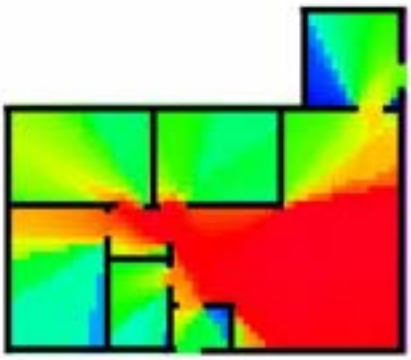
*Visual Integration***.**

Floor plans from a sample of house models currently used in Arviat were digitized as DXF files in Adobe Illustrator. The houses selected span the 1960s, 1970s 1980s and 1990s and are all single floor dwellings. Multi-storey dwellings were not included in this study as the upstairs portions of these houses are completely unobservable from the main floor and vice versa. For the purposes of this analysis, it is enough to say that multi-storey houses generate visual integration and C_i values that are significantly lower than all single-storey houses. The DXF files for each single storey house were next imported into Depthmap for processing.

Results indicate that the viewfields generated within each house vary dramatically across different models. Early models such as the 436, 439, and 455 (Figure 26), generate viewfields that widen considerably as one enters the living room from smaller adjacent rooms and short corridors. Within these houses, living rooms are toned almost completely red, indicating that they are the most visually integrated rooms in the dwelling. In other words, living rooms are highly visible spaces that can be seen from a wide range of locations throughout the house. In contrast, later models such as the Access, Weber and Wolfenden (Figure 27) generate viewfields that are generally much narrower, and which place limits on what can be seen when moving through the

Model 436 Houses (1968)

Model 439 Houses (1967)



Model 455 House (1973)

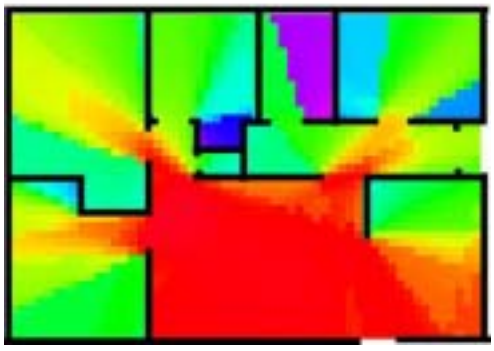
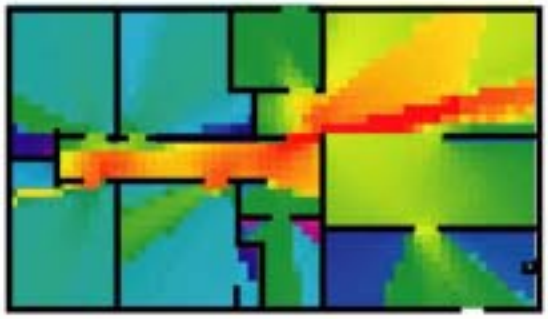
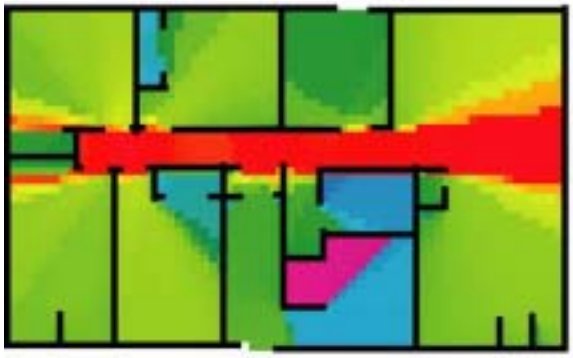


Figure 26. VGA graphs for early northern house models.

Weber Model House (1977)



Wolfenden Model House (1981)



Access Model House (1980's)

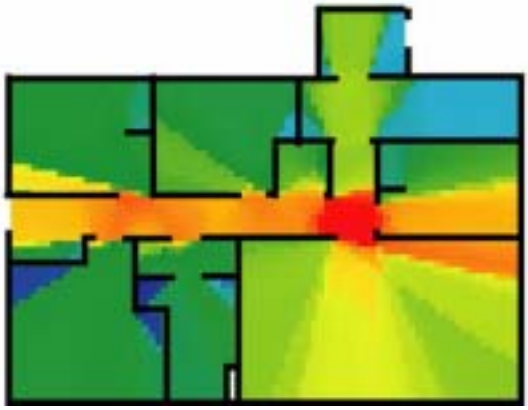


Figure 27. VGA graphs for later northern house models.

dwelling. In these houses, long corridors form the central axis of movement and the clearest unobstructed lines of sight (toned red). The narrowness of the viewfields generated by these corridors is due to the fact that adjacent rooms are connected at right angles to this central axis of movement. As a result, corridors and connecting rooms are not visually integrated into the house plan. This has the effect of limiting what can be seen from different locations within the dwelling.

Clustering Coefficient (C_i)

Clustering coefficients provide a measure of how much visual information is gained or lost as an individual moves from point to point in a building. Spaces with low clustering coefficient (C_i) values are toned towards the blue end of the color scale and occur at points where visual information is lost; for example, the junctions where rooms connect to corridors. As one moves from a narrow corridor into a larger open space, *Ci* values increase and more visual information is gained, toning the space towards the red end of the color scale. Figure 28 demonstrates that the floor plans of early house models (439, 455) generate only a few spaces with low C_i values (toned blue). These spaces are restricted to short, narrow corridors where individuals must make decisions about where to move next. The open nature of the floor plans of these houses means that little visual information is lost as one moves about, requiring fewer decisions about where to go, and fewer changes of direction. In contrast, Weber and Wolfenden houses (Figure 28) contain a greater number of areas with low C_i values (toned blue). These areas are found along the central corridor at junctions where decisions must be made about which room to enter. Such locations are often referred to as “pause points” and have the effect of truncating the fluidity of human movement because a greater number of decisions and changes of direction are required when moving through the dwelling. The greater the number of pause points, the greater the tendency for the floor plan of the dwelling to restrict the flow of visual information, and the more difficult it is for occupants to monitor the activities and locations of others.

To summarize, the wide, integrating viewfields and high C_i values generated by 400 series houses indicate that no appreciable loss of visual information occurs as one moves from location to

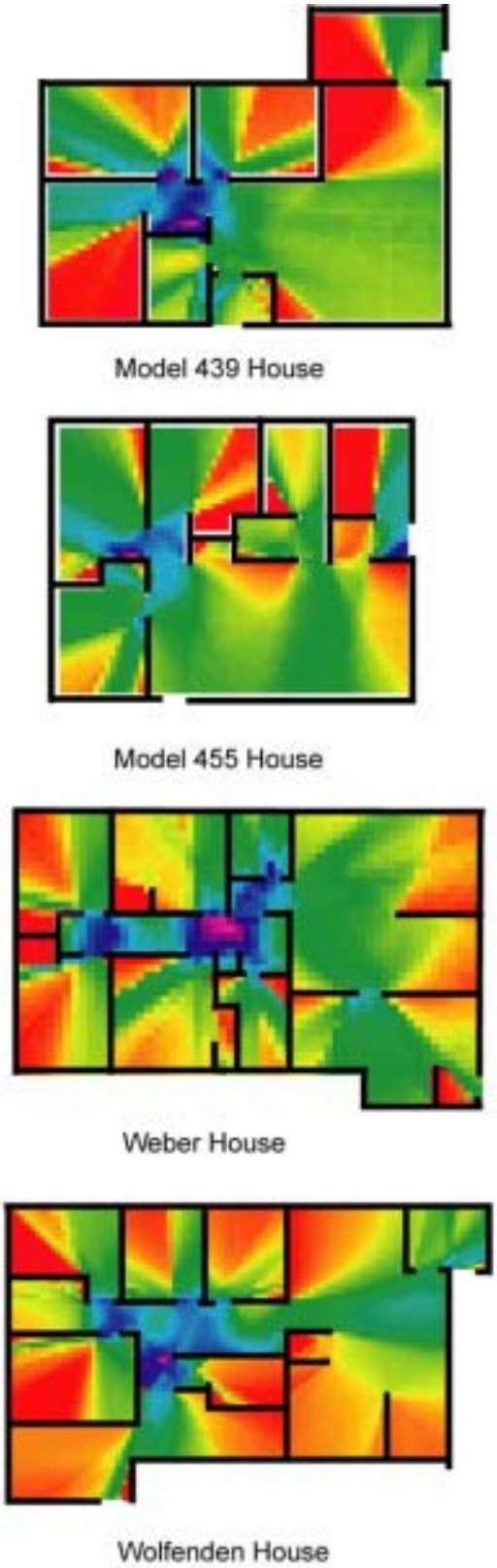


Figure 28. Clustering coefficient (*Ci*) graphs for various house models.

location. As a result, visual information about the presence of individuals and domestic activities can be acquired with a minimum of movement. In contrast, the narrow viewfields, higher frequency of pause points, and low C_i values generated by later house models, such as the Woolfenden and Weber, indicate that a greater amount of visual information is lost as one moves about these dwellings. Individuals must move from room to room in order to acquire visual information about where the location and activities of individuals are occurring.

The Effect of Visual Integration and Clustering Coefficients on the Use of Space by Inuit Families

In an earlier section of this report, I presented evidence that Inuit families sequence household activities according to integration[6], and that the majority of domestic activities tend to occur in the most spatially integrated room in the house: the living room. I explained that this is likely due to the fact that Inuit families are far more tolerant of 'lumping' together activities with different mechanical characteristics than are Euro-Canadian families, which tend to segregate domestic activities and spatially disperse them throughout the house. For Inuit families, domestic activities have a strong social context because they provide opportunities for socializing, thereby maintaining the solidarity of the extended family – the essential socio-economic unit of production in Inuit society. The collective aspects of Inuit domestic and family life, coupled with their intensive use of integrated space, indicate that they are most spatially compatible with more open floor plans that do not limit what can be seen, where one can go, and what one can do. The floor plans of early northern houses like the 436 reflect this type of spatial organization to a greater degree than later designs, such as Access houses, which subdivide the interior space into numerous smaller rooms connected together via a long central corridor.

By limiting what can be seen as one moves through the interior of such a house, visual information is lost as family members become spatially isolated from one another. Parents can no

[6] Here, integration was strictly a function of access rather than visibility.

Figure 29. An Inuit resident mounts a parabolic mirror (upper left) to the wall of his home.

longer easily observe and monitor the activities of children, watch over a boiling pot of caribou meat on a stove, carry on a conversation with a family member elsewhere in the house, and assist another family member in an important domestic task such as sewing. These types of activities often occur simultaneously in Inuit homes and are made difficult by the excessive partitioning of interior space. Evidence supporting this assertion can be seen in a case I documented where an Inuit resident had mounted a large parabolic mirror on the wall of his living room so that he could monitor activities that were simultaneously occurring in other areas of his house from a single vantage point (Figure 29). Because Inuit families function more collectively than Euro-Canadian families, they require greater access to visual information within the home. The trend towards greater internal partitioning in arctic housing runs counter to this requirement.

Architectural Trends in the Canadian Arctic since the 1960's

Over the last 30 years, there has been a tendency towards the design and construction of houses in the Canadian arctic with greater interior partitioning. In these houses, larger numbers of smaller

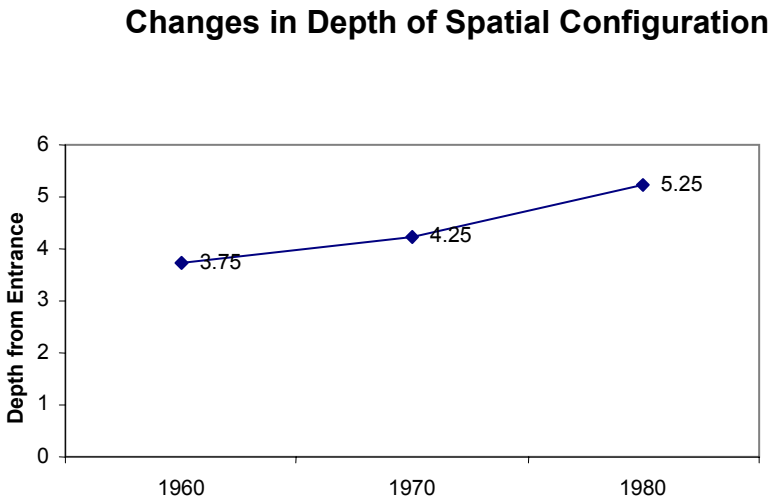


Figure 30. Changes in house depth through time.

rooms are connected together via a central corridor or single axis of movement. In some designs, these corridors vertically separate rooms by leading to a second storey. As we have seen, visibility graph analysis indicates that these forms of spatial configuration restrict the flow of visual information available to family members because they limit who and what can be seen as one moves through the house.

This trend towards the construction of houses with more compartmentalized or subdivided floor plans is illustrated by the depths and total integration (RRA) values calculated for houses constructed over the last 30 years. Figure 29 indicates that the distance from the point of entrance to the most recessed or deepest space in the house has increased through time. Likewise, Figure 30 reveals that the total integration (RRA) values of houses have also increased, indicating greater numbers of rooms with more varied integration values through time. These changes likely reflect the rising importance of individualism and personal privacy within Euro-Canadian families since the 1950s. To illustrate, when entering the house of a Euro-Canadian family in the south, it is often unusual to see more than two people in any single room at any given time. Instead, family members distribute themselves throughout the house, only coming together (if at all) for activities such as meals. Indeed, individuality and privacy have become

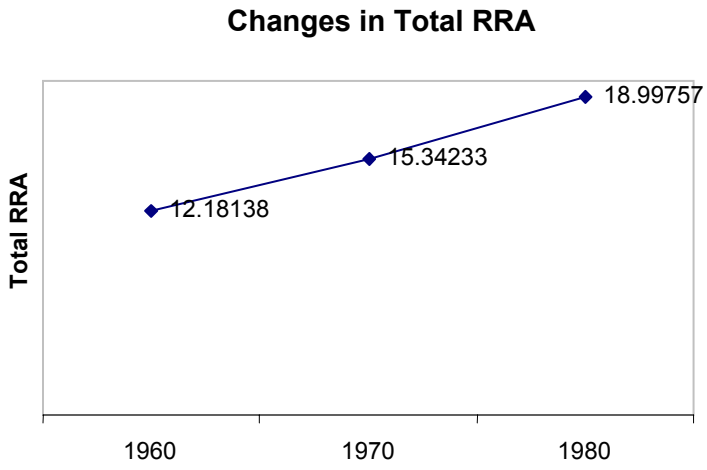


Figure 31. Changes in total integration of houses over the past 30 years.

highly prized in Western societies as a whole and these cultural values are expressed spatially in the floor plans of Euro-Canadian houses. In contrast, Inuit families place a much higher value on integration and solidarity within the extended family. Activities often involve many people because they serve as important tools for socializing and maintaining contact with other family members. In addition, a wide range of activities are often situated in the same location. The analysis completed thus far indicates that most activities which take place in the house do so in the most integrated spaces. It would therefore seem as though Inuit families are generally far more tolerant of "lumping" together different types of activities in single locations than are Euo-Canadian families, which tend to distribute domestic activities within their homes in a much more dispersed fashion.

The observational data contained in this report suggest that a more compatible design could be achieved by eliminating the central corridor. Instead, rooms (bedrooms, bathrooms) could open directly onto a single, large unpartitioned space containing a kitchen and living room.

Modifications Made by Inuit Residents to their Houses

The fact that current house designs used in the north are not adequately meeting the needs of Inuit

families is best illustrated by some of the modifications that Inuit have made to their houses to solve design problems. One individual in particular has made a number of innovative changes which he believes makes his house safer, more user-friendly, and cost-effective. These modifications include the following:

1. In order to save money on heating bills, he placed skirting around the base of his house, leaving the south side open so that the warmer southern winds travel under the house.

2. He selected a rocky location for the construction of his house in order to minimize the shifting of the foundation and subsequent need to periodically level the house.

3. In the winter, he piles snow up against the side of his house high enough so that it insulates the dead air space under the house.

4. He devised an innovative door locking system that allows his family to leave the house quickly in case of fire (Figure 31).

5. He has replaced the standard front door handle with a heavy duty industrial handle, and spring loaded the door with bungee cords so that it closes automatically. Prior to this, the constant stream of visitors to and from his house resulted in the door being left open, thereby increasing his heating bills (Figure 32).

6. He replaced the 5-gallon toilet with a foot peddle version which uses less water, thereby saving on utility costs.

7. He spent $500.00 on linoleum which he fastened to the lower portions of the walls of his house to prevent damage caused by the scratching and drawing of children (Figure 33).

8. The L-shaped layout of the kitchen and living room prevented people in one area observing the activities of people in the other. In order to solve this problem, the resident suspended a parabolic surveillance mirror on a wall that increased what could be seen from the perspective of both spaces (Figure 29).

Figure 32. Locking system designed by Inuit resident.

Many of these modifications were designed to save the family money which was desperately needed to pay for boat and ATC gas, ammunition, and other items necessary for traditional activities such as hunting and fishing.

Combining Observational Data with Spatial Analysis of Northern Houses: Design Recommendations

When we combine the observational data collected on Inuit space use with the computer analysis of the spatial geometry of Northern houses, the results inform on how the architecture of Canadian arctic homes could be modified to better accommodate Inuit families. In this section, I present a summary of the findings of this report, and use this summary as a base line for suggesting possible design modifications.

Figure 33. Bungee cords used to spring-load a house door so that it is not left open.

Figure 34. Linoleum flooring fastened to walls to protect them from damage by children.

A. Summary of Observations and Spatial Analysis

1. The types of domestic activities Inuit families in Arviat currently engage in differ significantly from those of southern Euro-Canadian families. These differences reflect cultural values in Inuit society which emphasize the social solidarity of the extended family, and its primary function as a network of mutual assistance. The domestic activities of Inuit families also reflect their continued reliance on a land-based economy.

2. When domestic activities are sequenced according to spatial integration, Inuit families distribute their activities differently than Euro-Canadian families. While Inuit families concentrate a wide range of activities in a few highly integrated spatial locations, the activities of Euro-Canadian families are more widely dispersed throughout the house. This likely reflects the fact that domestic activities provide opportunities for socializing, information exchange, and the continual re-affirmation of family solidarity. The spatial integration of Inuit family activities also likely reflects different cultural values associated with individuality and privacy.

3. Over the past 30 years, house designs built in the north have become increasingly sub-divided, resulting in greater numbers of rooms which differ in degree of accessibility. Increasing internal partitioning has also narrowed view fields, resulting in the loss of visual information as one moves about the house. By limiting what can be seen, the addition of more walls makes it difficult for individuals to interact with other family members and monitor/participate in their activities.

4. The changes in spatial configuration identified in (3) would seem to be incompatible with the observations outlined in (2). Spaces are often too small to accommodate the unique activities of Inuit families. Furthermore, the primary function of the Inuit family as a network of mutual assistance means that it is far more socially integrated than a Euro-Canadian family. Because higher degrees of social integration require higher levels of visual information, the trend towards increasing spatial segregation in Euro-Canadian house forms is likely incompatible with the social structure of Inuit families. The effect is that the unique domestic activities of Inuit households are more difficult to organize, execute, and monitor.

5. Inuit residents have attempted to improve on the incompatible aspects of their house designs by implementing a number of innovative changes using everyday materials that are inexpensive and easily obtained.

B. Design Recommendations Based on Observational Data and Spatial Analysis

1. **The construction of houses with more open floor plans generating wider viewfields that do not restrict the flow of visual information**. This could be achieved by eliminating long central corridors from which other rooms are accessed. Instead, smaller rooms such as bedrooms, utility rooms and workshops would open directly onto a single, large open space.

2. **The integration of kitchen and living room into this single, enlarged space.** This type of layout coincides with observational data which indicates that most family activities take place in the living room and kitchen.

3. **The construction of large enclosed cold porches on the front of the house.** This design modification is supported by observations of the need for cold porches in the facilitation of traditional activities such as hunting and fishing. These enclosures should be fitted with a locking door to deter instances of theft.

4. **The elimination of multi-story dwellings in favor of single-floor dwellings.** This would reduce the problem of the overheating of the second floor during the summer months, as well as widen viewfields throughout the house thereby increasing its visual accessibility. This recommendation also addresses a preference for single floor dwellings expressed by the majority of Inuit families.

5. **The replacement of small standard kitchen sinks with larger stainless steel sinks to accommodate traditional foods which tend to be larger and bulkier than store-bought western foods.**

6. **The addition of more energy efficient stoves with larger heating elements to accommodate the boiling of traditional foods such as caribou meat in large cooking pots.** Alternatively, the construction of outdoor brick fire pits so that large pots of meat can be brought to boil more quickly and efficiently.

7. **The construction of larger storage cupboards in kitchens to accommodate large cooking pots which are important in the preparation of traditional foods.**

8. **The addition of better ventilation systems to accommodate large amounts of condensation released during the boiling of traditional foods in large cooking pots.**

9. **The addition of self-closing (spring-loaded) doors to reduce heating bills during cooler months. This would eliminate the problem of children and visitors leaving doors open when entering and exiting the house.**

10. **The development and construction of more storage solutions for clothing, toys, and other items used by Inuit families**

11. **The construction of elevated gravel pads along the sides of houses to serve as dedicated work areas for repairing snowmachines, ATC's, boats, komatiks, etc.** The elevation of these gravel platforms would deter people from driving in between houses and prevent the pooling of water. In addition, the gravel could be changed periodically to remove the accumulation of pollutants such as oil and gas spills.

12. **The placement of skirting around the foundations of all houses, leaving southern sides open to warmer winds, thereby reducing heating bills**

13. **The replacement of all door hardware (knobs, locks) with heavy duty industrial latches and handles.**

14. **The attachment of vinyl or linoleum sheets to lower portions of interior house walls to reduce damage caused by scratching and drawing from children.**

Conclusions

The results of this study demonstrate that Inuit families continue to engage in domestic activities that differ considerably from those of Euro-Canadian families. Unlike Euro-Canadian families, the extended family in Inuit society also function as an essential network of mutual assistance for sharing equipment, food, and labor. This is reflected spatially in the aggregation of most domestic activities in one or two of the most integrated spaces in the house. In order to function collectively, family members require visual information about the locations of family members and their activities at any given time.

Over the past several decades, the increasing segmentation of interior space in Arctic houses has resulted in greater numbers of smaller rooms that are connected together in ways that restrict human movement and the flow of visual information. In these houses, domestic activities are frequently crowded into integrated rooms or relocated to areas outside of the home because room sizes are too small. The result is that the household can no longer operate efficiently because individuals cannot effectively monitor the locations and activities of others. The increasing compartmentalization and restricted flow of visual information in Euro-Canadian house forms is entirely compatible with Euro-Canadian family values that stress privacy and individuality. Unfortunately, they are spatially incompatible with Inuit family values that stress integration and communality.

At a recent meeting of the Canadian Association for Suicide Prevention, the results of an Inuit-supervised study on well-being, sadness, suicide, and change in two northern communities was presented. Results indicate that family was most commonly related to suicide prevention and intervention. Unhappiness was tied to not being with family and not visiting, and family bonding was listed as one of several essential elements of Inuit well-being. These findings demonstrate the importance of the Inuit family as a network of mutual assistance for emotional support . It is

therefore critical that architects begin to explore ways for sustaining these elements of family life in northern house forms. This can be achieved through the continuation of studies such as the one presented here, as well as through studies of how Inuit cultural values were embodied in traditional Inuit architecture, as can be seen in the following quote by anthropologist Edmond Carpenter (1959), who states:

> ".....visually and acoustically, the *iglu* is open; a labyrinth alive with the movements of crowded people. No static walls arrest the eye or ear, but voices and laughter come from several directions and the eye can glance through here, past there, catching glimpses of the activities of nearly everybody".

The idea that an understanding of traditional Inuit architecture might assist in the design of houses that better reflect Inuit cultural values is currently being explored by the Nunavut Housing Corporation through Inuit *Qaujimajatuqangit* (knowledge of all areas of life). By asking Elders to share their knowledge of traditional architecture, new and innovative solutions to existing designs problems could be developed. However, Inuit *Qaujimajatuqangit* is only one side of a two sided coin. By combining Inuit *Qaujimajatuqangit* with field observations of space use by Inuit families, a more complete understanding of the housing needs of Inuit families can be obtained. This is because what people say they do is sometimes different than what they actually do. To this end, the results of this 2 month study of families in the community of Arviat have produced a great deal of information that can be used to develop and marshal new and innovative housing strategies in the Canadian Arctic. Many of the recommendations that have come out of this study should be relatively inexpensive and easy to incorporate into existing house designs. However, it is critical that this study be expanded into other Inuit communities across Nunavut. Such a long term, systematic study could be used to anticipate the future housing needs of Inuit families as they continue to change in structure and composition.

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